CLUES TO THE CAUSES OF CANCER OF THE KIDNEY *

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AT the present time almost nothing is known of the *causes* of cancer of the kidney in man. Of course, much has been learnt in recent years about the diagnosis, pathology, and treatment of renal cancer; but as to ætiology we have not even reached the guessing stage. We are still groping round looking for clues.

Let me remind you that in the detection of crime anything, however trivial or apparently accidental, may perhaps prove to be a clue or provide a missing link in the chain of evidence. But clues are seldom " ready-made ": at first there are only observable facts, and more information has generally to be obtained before these facts begin to fit together as a possible clue. This is just where we are at present in relation to the causes of cancer of the kidney. We are busy collecting facts and looking for clues, and therefore all I can do is to suggest likely places where clues might later be found, or to indicate possible approaches to our problem.

I am one of those who think that in the immediate future we are likely to learn most from studying the induction of kidney tumours in animals. But before plunging into this newly explored and inviting territory, I should like to say something about three clinical ways of approach which seem to me to hold particular promise —namely, the further study of geographical pathology, occupational hazards, and genetics.

The Clinical Approach

Geographical Pathology

Geographical pathology might teach us more about the incidence of kidney cancer in different races and in different places—a subject about which we know at present almost nothing. For cancer of some other organs of the body the value of studies in geographical pathology has recently been demonstrated by Dr. R. A. M. Case (1958). But we must admit at once that the collection of reliable statistics about the geographical distribution of kidney cancer is likely to be a formidable task because this is such a comparatively rare form of malignant disease, constituting in this country only 1 or 2% of cancers at all sites. Meanwhile it might be worth making small " pilot " inquiries to see whether, in some suspected localities, malignant disease of the kidney is significantly commoner. Such local inquiries have certainly provided clues to the causes of cancer of the liver.

Occupational Hazards

The report of the subcommittee of the British Association of Urological Surgeons (1961), under the chairmanship of Mr. D. S. Poole-Wilson, on occupational tumours of the urinary tract was intended primarily to give guidance on cancer of the bladder; but the carcinogenic chemicals mentioned might also cause cancer of the kidney, though doubtless less often.

In dye workers two cases of papillomatous disease of the renal pelvis have been reported by Macalpine (1947). These patients first attended hospital for treatment of papillomata of the bladder, and the kidney lesions were not recognised until 4 or 5 years later. Both patients had worked as process men in the manufacture of benzidine and tolidine, and they had handled other products which might have been carcinogenic. Macalpine referred to six other examples, in dye workers, of tumours of the renal pelvis, but I have not been able to find any recorded tumour of the renal parenchyma attributable to this cause.

What a useful " clue " Percivall Pott provided when, in 1775, he published his short treatise on chimney sweepers' cancer of the scrotum! This masterpiece reminds us that occupational hazards are most likely to be discovered by one individual reflecting on his own experience, or by a long follow-up of the health of special groups of industrial workers.

Genetics

In most cases of kidney cancer there is nothing to suggest that heredity has played any part in causation. The same is true also for most renal tumours in animals. But from time to time special strains of rats and mice have been met in which renal tumours have seemed to be genetically determined. For instance, Eker (1954) discovered a strain of Wistar rats in which multiple bilateral renal adenomas were exceptionally common and were apparently determined by a dominant gene (Eker and Mossige 1961). Claude (1958) has studied spontaneous adenocarcinomas in an inbred line of mice, about 40% of the adults of both sexes being affected. In rhesus monkeys familial renal carcinomas have occasionally been reported (Ratcliffe 1940).

Although there is no evidence for direct inheritance in most cases of human kidney cancer, I still think it is worth exploring this question further by carefully recording family histories, because this might lead to the discovery of some families in which renal cancer is genetically determined. The family recently reported by Brinton (1960) might possibly be an example: the father had a kidney tumour, and three of his five children developed renal carcinoma from which they died aged 62, 52, and 54. This might have been chance, but alternatively it might be the expression of a rare genetic defect transmitted in this particular family.

Experimental Kidney Tumours

As I have said, the most promising line of inquiry in the immediate future is the experimental production of kidney tumours.

Malignant tumours of the kidney are known to occur naturally in many different species of animals, both domestic and wild. As in man, there are two main types: (1) a mixed tumour derived from immature tissue, known as a nephroblastoma, which corresponds to the Wilms' tumour in children; and (2) an adenocarcinoma arising later in life, which corresponds in man to what used to be called a hypernephroma. Transitional-cell carcinomas

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derived from the renal pelvis, sarcomas, and malignant lymphomas are also seen in the kidneys of animals.

Before discussing ways in which kidney tumours may be induced experimentally, I must point out that spontaneous renal tumours are very rare in laboratory rats, mice, guinea-pigs, and hamsters. Kidney tumours are rare also in farm animals, as Cotchin (1960) has shown from his analysis of those examined at the Royal Veterinary College, London, in 1950–60.

The fact that renal tumours so seldom occur naturally in animals gives special significance to the facility with which they can be produced experimentally by the special methods which I shall mention. But I shall refer only to methods which are known to be successful in a high proportion of cases, and to those which seem to bear some possible relation to kidney cancer in man.

Three agents are known to cause kidney cancer in certain animal species—namely, viruses, œstrogenic hormones, and carcinogenic chemicals. But, because each agent is almost exclusively species specific, we must not jump to the conclusion that any of these may cause cancer in man. I ask you to consider them only as possible clues—not as possible causes.

Viruses

Nearly 30 years ago Dr. Balduin Lucké noticed that renal tumours were present in about 2% of the frogs supplied to his class in the physiology laboratory of Pennsylvania University:

> The tumours varied in size from tiny nodules to large masses which had almost completely destroyed the kidney. Many of the smaller tumours appeared to be benign adenomas of the renal cortex, but the larger ones were obviously adenocarcinomas. Metastases were often found in the lungs, liver, and other abdominal organs (Lucké 1934).
>
> In later studies some of the tumour cells were seen to contain cell inclusions resembling those known to occur in virus diseases, and Lucké concluded that this form of renal carcinoma is caused by a virus (Lucké 1938, 1939, 1952).
>
> Further support for this has been lent by the fact that, if tumour grafts are introduced under the frog's skin or into the abdominal cavity, no tumours arise at the inoculation sites but new growths develop within the kidney. Similar results can be obtained with grafts that have been killed by cold or prolonged storage in glycerol.

All this suggests that these kidney tumours are the result of infection by a virus which has a selective affinity for the renal epithelium (Oberling 1952).

The Lucké kidney tumour affects only the leopard frog (*Rana pipiens*), a species not found in this country; but Dr. E. Elkan has reported a similar renal carcinoma, with virus-like inclusion bodies, in a xenopus toad (Elkan 1960), and in tropical fish Wessing and von Bargen (1959) have described a malignant kidney tumour which can be transferred by cell-free extracts.

In recent years there has been a remarkable revival of interest in viruses as agents in the induction of tumours. This has been encouraged by new techniques for the tissue culture of viruses, and by the astonishing results of infecting newborn or very young animals with a number of different viruses (Stanton et al. 1959):

> For instance, Negroni and Chesterman (1960) found that, when the Mill Hill polyoma virus was injected into hamsters at birth or shortly afterwards, kidney tumours developed, beginning sometimes as early as the 3rd day after inoculation. Using the same virus, kidney tumours have been induced in rats and mice (Chesterman 1961) and in ferrets (Harris et al. 1961).

Again, Carr (1960) has shown that a virus known to cause leukæmia in fowls will also induce kidney carcinoma provided the injection is made into very young chicks. Of special interest is the work of Ham et al. (1960), who propagated a tumour virus in cultures of mouse-kidney cells and injected this into newborn hamsters. Tumours developed rapidly in the kidneys and in other organs—so quickly indeed that many animals died from the effects of multiple tumours as early as 10 days after receiving the virus.

No doubt there is still much to learn about the consequences of injecting viruses at an early age. It may seem at first that this bears little direct relation to human cancer; but, if we are on the lookout for clues, we should reflect on the remarkable fact that in some animals kidney tumours can be produced easily by injecting a virus soon after birth.

Œstrogenic Hormones

The discovery that kidney carcinoma can be induced by a hormone was made by Kirkman and Bacon (1952), of Stanford University, in 1949. They found that long-continued treatment with natural or synthetic œstrogens induced kidney neoplasia in the male hamster. This work was confirmed and extended by the late Prof. Eric Horning at the Chester Beatty Research Institute, and I have had the privilege of continuing some of it since Horning's untimely death in November, 1959.

There is no doubt that these œstrogen-induced kidney tumours of the male hamster possess all the histological characteristics of malignant lesions. The neoplasms are often bilateral and multifocal, and they appear to be derived from the epithelium of the convoluted tubules. The tumours are not encapsulated, except perhaps at first, and they spread by direct continuity throughout the kidney and into adjacent tissues. When metastases occur they are at first intra-abdominal, but they may be found later in the lungs and cervical lymph-nodes.

The induction of kidney tumours in the hamster by stilbœstrol appears to be unique: after similar treatment other species of rodents do not develop renal tumours. Of course, the hamster is a peculiar little creature in many respects, and all the golden variety now kept as laboratory animals in Europe and America originate from three hamsters—one male and two female—the survivors of a small group which were caught near Aleppo in July, 1930. Because hamsters were valuable for research on bacterial infections, they were bred by Prof. S. Adler, of the Hebrew University at Jerusalem, and distributed to many laboratories throughout the world (Adler 1948).

To account for the apparent species specificity of this tumour, Horning suggested that the liver of the hamster differs from that of the rat, mouse, and guineapig, in that it is unable to cope adequately with the inactivation of œstrogens (1957). He thought that kidney cancer in the hamster might be due to absorbed chemical carcinogens acting selectively on the renal epithelium during excretion. This hypothesis was strengthened by the fact that kidney tumours can be induced in the hamster by subcutaneous injection at a remote site with 3:4-benzpyrene. After similar treatment no tumours developed in albino rats.

Horning (1954) also showed that stilbœstrol-induced tumours developed more rapidly in male hamsters if one kidney was removed, and he thought this might be associated with the fact that a single kidney is unable to eliminate the œstrogenic metabolites effectively. At first serial transplantation of this tumour was only successful in hamsters which continued to be supplied with œstrogen; but, after many successive transplants in stilbœstrol-

treated male hamsters, Horning later succeeded in transplanting this tumour into hamsters not treated with stilbœstrol. Since then this tumour has been kept going at the Chester Beatty Research Institute by serial transplantation in male hamsters not given additional stilbœstrol.

Kirkman, the discoverer of this tumour, at first reported that renal neoplasms were induced only in *male* hamsters: but he succeeded eventually in producing similar tumours in females by starting œstrogen treatment after removal of the ovaries, or at times of low progesterone secretion, or before reproductive maturity (1959). He concluded that the induction of tumours in œstrogen-treated female hamsters is normally prevented by their natural progesterone. For these reasons he suggested that progesterone might be useful for treating patients with inoperable metastatic renal carcinoma, and this is now being investigated by Dr. Julian Bloom and a group of associates at the Chester Beatty Research Institute.

Carcinogenic Chemicals

Kidney tumours can be induced in laboratory animals by many different carcinogenic chemicals administered by injection or implantation. This has been shown by Ilfield (1936), Sempronj and Morelli (1939), Esmarch (1942), Zollinger (1953), Magee and Barnes (1956, 1959), Matthews and Walpole (1958), Van Esch and Van Genderen (1959), and Connell (1961). Instead of attempting to review all of these, it seems better for me to confine myself to research in which I have had a share. Although this experience is strictly limited, it is concerned with a familiar substance—namely, lead—administered by a natural route, the mouth.

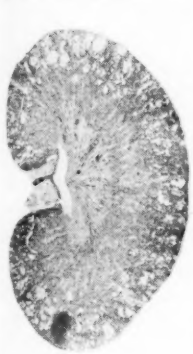

Fig. 1

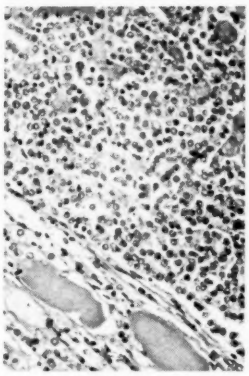

Fig. 2

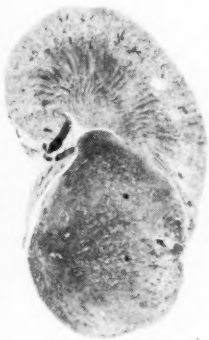

Fig. 3

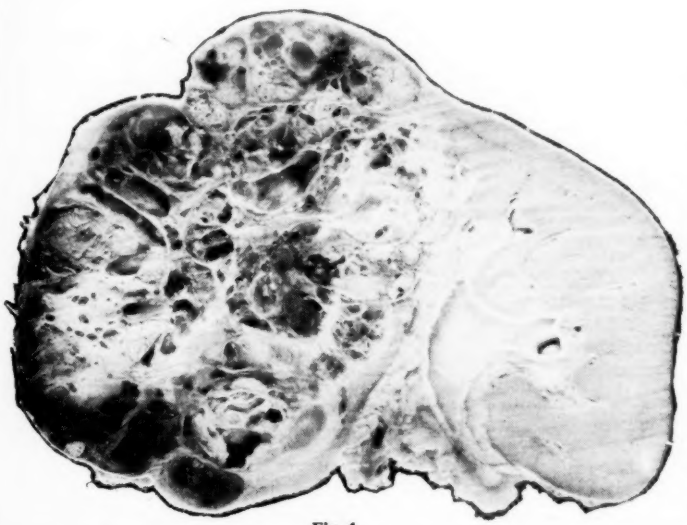

Fig. 4

Fig. 1—Cut surface of kidney of rat fed with lead-acetate diet for 11 months, showing a small focus of carcinoma embedded in the cortex of the lower pole.
The kidney was normal in size measuring 3 cm. in its long axis.

Fig. 2—Histology of renal carcinoma in rat fed with lead-acetate diet: same case as fig. 3. (×160 and reduced by two-thirds.)

Fig. 3—Cut surface of kidney of rat 18 months after feeding with lead-acetate diet, showing a large focus of carcinoma in the lower pole.
The kidney was enlarged and measured more than 3·5 cm. in its long axis.

Fig. 4—Cut surface of human kidney showing large carcinoma in upper half. Nephrectomy by Mr. Clifford Morson in 1947.
The kidney was enlarged and measured 17 cm. in its long axis.

As far as I have been able to ascertain, the first proof that lead might cause renal neoplasms came 8 years ago, when Zollinger (1953) reported that the subcutaneous injection of lead phosphate gave rise to kidney tumours in rats; some of these were described as renal adenomas and others as carcinomas. His results were confirmed by Walpole and Williams (1958), and by Van Esch and Van Genderen (1959), who reported also that renal tumours might follow if the lead was administered by mouth. This became the starting point of research into the carcinogenic properties of lead compounds at the Chester Beatty Research Institute with which I have been helping for the past 2 years.

Prof. E. Boyland first prepared a diet containing 1% lead acetate, and this was fed to twenty male rats for more than a year. No less than fifteen of these rats ultimately developed renal tumours. A full report of this work will shortly be published, and I will only mention now that the first renal tumour was discovered in a rat which had received the lead-acetate diet for 11 months. This rat was killed because it was obviously ill, and I found a small solid nodule in the right kidney, which proved to be an early focus of carcinoma (fig. 1).

Four more of the laboratory rats were then killed and examined. In one no abnormality was found, but in the other three small tumours were present in each kidney. Most of these were adenomas—either solid or papillary in structure—but some were definitely malignant, and their histology closely resembled that of renal adenocarcinoma as seen in man (fig. 2).

Eleven of the original twenty rats survived for more than 12 months, and each of these was killed as soon as a tumour could be palpated or when the animal seemed ill. Renal neoplasms were found in all these eleven animals: some were adenomas and others carcinomas (fig. 3).

The fact that renal tumours develop in rats fed with a diet containing lead acetate

is an important observation, and it is surprising that it has not been made before, because lead poisoning has been much studied, and it is known to cause chronic nephritis in both man and animals. In man the lesions are primarily vascular, and chronic nephritis caused by lead is histologically indistinguishable from other forms of arteriosclerotic nephritis. In rats and most other laboratory animals prolonged feeding with lead soon results in obvious damage to the epithelium of the renal tubules, and the blood-vessels, glomeruli, and interstitial tissues are less affected. Later the kidneys appear granular, and they contain innumerable small cysts, which are lined with cuboidal or flattened epithelium (Finner and Calvery 1939, Pardoe 1952). All the rats which were fed with lead acetate developed this form of chronic cystic nephritis within 6 months, and it was only later that tumours developed.

To explain why this unexpected carcinogenic activity of lead has not been recorded before, I must point out that in many previous researches into renal lesions caused by lead the animals have been killed before tumours might have developed. Another reason is that animals vary greatly in their response to ingested lead: some, like rats, can tolerate large doses, whereas most others quickly suffer from lead poisoning. I must also add that in their early stages renal tumours in rats do not cause any surface abnormality or noticeable enlargement of the kidney. At first they can be detected only by fixing the entire kidney in 10% formalin, and then cutting thin slices with a sharp knife, when they appear as tiny greyish-white nodules.

The unexpected discovery that cancer of the kidney can be caused by long-continued administration of lead opens up new avenues for research, and Professor Boyland has already started a large-scale experiment to elucidate the carcinogenic action of lead, and to discover other chemicals which under similar circumstances might cause renal tumours.

It may be found that other chemicals, when added to the food of susceptible animals, will eventually result in the production of renal tumours and so provide a clue to one of the causes of cancer of the kidney in man.

Epilogue

Now let us leave the world of frogs, hamsters, and rats and return to mankind. I began with human beings, and I end with them.

One of the last patients on whom Mr. A. Clifford Morson operated had cancer of the kidney, and it happens that I examined the operation specimen. The photograph attached to my report shows a large carcinoma occupying the upper half of the kidney (fig. 4). At that time—15 years ago—we had few, if any, clues to the causes of cancer of the kidney. I am not going to pretend that we are much wiser now, but at any rate we are beginning to discover more and more " possible clues ".

Summary

Clues to the causes of cancer of the kidney in man might be provided by closer study of the geographical distribution of renal tumours and the influence of occupational hazards, and by the application of the modern techniques of genetics.

Cancer of the kidney can be induced experimentally in some amphibians by specific viruses, in hamsters by œstrogenic hormones, and in rats by carcinogenic compounds. In particular renal cancer can be induced in rats by long-continued feeding with a diet containing large quantities of lead acetate.

References at foot of next column

GIANT-CELL ARTERITIS WITHOUT HEADACHE

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PAINFUL stiffness of the shoulders and hips is common in giant-cell arteritis, and it may last several years after the initial headache (Roux 1954). Identical symptoms also occur without the characteristic head pains of cranial arteritis, and the term " polymyalgia rheumatica " has been applied to this syndrome (Barber 1957). In the latter condition Gordon (1960) failed to find specific lesions in biopsy specimens of affected muscle, and he regarded it as a disease sui generis. Arterial lesions were not, however, found in similar specimens from cases of cranial arteritis (Ross-Russell 1959), and both disorders are probably manifestations of the same disease process (Paulley 1956, MacGregor 1958, Ross-Russell 1959). The identity of the two syndromes can be established only when their cause is known, and this is discussed with reference to 12 cases seen in the past three years.

Case-records

Case 1.—A 65-year-old woman was suspected of having myelomatosis in September, 1958. For six weeks she had felt pain and weakness in her back and thighs, making stair-climbing difficult. She was pale, constipated, and febrile (temperature 99–100°F), with slight effusions in both knees and a blood-pressure of 190/110 mm. Hg.

Investigations.—Hb 58%, white blood-cells (W.B.C.) 9200 per c.mm., platelets 610,000 per c.mm., erythrocyte-sedimen-

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tation rate (E.S.R.) 105 mm. in the first hour (Westergren), plasma albumin 4·1 g., globulin 3·2 g. per 100 ml., sternal marrow normal. The red cells were hypochromic, and occult blood was found in the stools. Barium enema showed localised stenosis of the sigmoid colon suggesting diverticulitis (Dr. P. Davies).

Treatment and progress.—The narrowed segment was resected because no other cause was found for the persistent fever, and the radiological diagnosis was confirmed. No improvement followed operation, and the patient was given 10 mg. of prednisone daily during convalescence. She was no better two weeks later, and complained of stiffness of both shoulders. Investigation in St. Thomas's Hospital revealed only fever, iron-deficiency anæmia (Hb 52%), thrombocytosis (467,000 per c.mm.), and raised E.S.R. (120 mm. in the first hour). A " collagenosis " was suspected, and she was given 20 mg. of prednisone daily. Her condition immediately improved, and during the next month the prednisone was reduced to 10 mg. daily. Further reduction in the dose resulted in a return of pain, but in May, 1959, when her hæmoglobin was 94% and E.S.R. 33 mm. in the first hour, the maintenance dose was reduced to 5 mg. daily. Some pain in the buttocks and weakness of the thighs persisted for a further nine months, when steroid therapy was stopped. She had no symptoms three weeks later (Hb 98%, E.S.R. 12 mm. in the first hour), and has remained well since.

Case 2.—A 63-year-old woman developed pain in the left buttock, night sweats, anorexia, and loss of weight in December, 1954. In hospital two months later, she was pale, weak, and febrile (temperature 100–101°F), with an aortic sclerotic murmur and a blood-pressure of 190/100 mm. Hg.

Investigations.—Hb 75%, W.B.C. 12,000 per c.mm., E.S.R. 110 mm. in the first hour. Chest X-ray showed cardiac enlargement and an unfolded aorta. The patient was tender in the right hypochondrium, and cholecystography showed gallstones.

Treatment and progress.—The patient's gallbladder was removed because no other cause was found for the fever. This continued, however, and in June, 1955, she developed " frozen " shoulders. A " collagen disorder " was suspected, and her symptoms rapidly responded to treatment with corticotrophin. The E.S.R. remained 20–30 mm. in the first hour until April, 1959, and steroid therapy was continued until she came under my care in August, 1960. She remained well three months after cessation of treatment (Hb 99%, W.B.C. 8600 per c.mm., E.S.R. 15 mm. in the first hour).

These 2 patients were subjected to unnecessary operations, and a diagnosis was made only after the response to steroid therapy prompted review of their histories. Giant-cell arteritis was not at first suspected because headache was not a feature of either case.

Case 3.—In May, 1959, a woman of 67 awoke in the night with painful cramp in the left thigh. Next day she ached all over, particularly in the thighs, shoulders, and back of the neck. The pains continued, and in hospital seven weeks later the patient was febrile (temperature 100–101°F), and movement of both shoulders was restricted. The nape of her neck was tender, but both temporal arteries appeared normal, and her blood-pressure was 135/80 mm. Hg.

Investigations.—Hb 84%, W.B.C. 6400 per c.mm., E.S.R. 50 mm. in the first hour, plasma albumin 3·6 g., globulin 3·4 g. per 100 ml., L.E. cells absent, Rose-Waaler test negative.

Treatment and progress.—After ten days, 30 units of corticotrophin gel was given daily with prompt disappearance of the fever and pains. Shoulder movements became full, and the patient was discharged taking 10 mg. of prednisone daily. Muscle pains, weakness, anorexia, and elevation of the E.S.R. recurred on three occasions when the dose of prednisone was reduced, but she was well in September, 1961, taking 5 mg. b.d. (Hb 90%, E.S.R. 28 mm. in the first hour).

Case 4.—In June, 1959, a 77-year-old woman entered hospital complaining of anorexia and pain in the shoulders for nine months. She was febrile (temperature 100–101°F), and looked ill. Shoulder and neck movements were full, but the neck muscles were tender at the base of the skull. Her blood-pressure was 180/100 mm. Hg, and both temporal arteries were normal.

Investigations.—Hb 72%, W.B.C. 10,000 per c.mm., sternal marrow normal, E.S.R. 125 mm. in the first hour, plasma albumin 3·8 g., globulin 1·5 g. per 100 ml., Rose-Waaler test negative. Chest X-ray showed an unfolded aorta and a normal heart outline, and an electrocardiogram (E.C.G.) was normal.

Treatment and progress.—The patient's symptoms improved when she was treated with 20 mg. of prednisone daily, but the temperature rose again after four days, and 30 mg. daily was needed to control the fever. She was well enough to go home two weeks later, taking 20 mg. of prednisone daily. The dose was gradually reduced, and in October, 1961, the patient was taking 2·5 mg. b.d. She is well and has gained 12 lb. in weight since treatment was started.

Neither of these patients complained of headache, but pain in the neck muscles was associated with tenderness in the region of emergence of the occipital arteries. The presumptive diagnosis of giant-cell arteritis was confirmed by their response to treatment.

Case 5.—On her way home from church in March, 1959, a woman of 71 had sudden pain in both hips, severe enough to prevent walking. Two days later she had shooting pains in the neck and shoulders, relieved only by lying still. She had no headache, but remained in bed for five weeks because the muscle pains persisted. Seen then, she had " frozen " shoulders, painful hip flexion, and a slight effusion in the left knee. Her temperature was 99·4°F. Both temporal arteries appeared normal, and her blood-pressure was 150/100 mm. Hg.

Investigations.—Hb 90%, W.B.C. 7000 per c.mm., E.S.R. 40 mm. in the first hour, Rose-Waaler test negative. Chest X-ray showed an unfolded aorta, and an E.C.G. was normal.

Treatment and progress.—The patient was treated with phenylbutazone without improvement, and aspirin and physiotherapy were tried. In July, 1959, she was a little better and in April, 1960, she had completely recovered (Hb 94%, E.S.R. 7 mm. in the first hour).

Case 6.—A 65-year-old woman developed sudden pain in both groins in October, 1960. It spread to her thighs and knees two days later, and was severe enough to disturb her sleep. She lost her appetite, sweated excessively, and felt depressed. Treatment with traction and phenylbutazone was ineffective, and she began to have pains in the neck. Both arms ached, and when first seen in January, 1961, she had " frozen " shoulders and had lost 16 lb. in weight. She had no headache, and both temporal arteries appeared normal. Her blood-pressure was 150/100 mm. Hg, and a chest X-ray showed no abnormality.

Investigations.—Hb 106%, W.B.C. 8400 per c.mm., E.S.R. 23 mm. in the first hour.

Treatment and progress.—The patient's symptoms were completely relieved by 20 mg. of prednisone daily, and she remains well taking 10 mg. daily.

Case 7.—After shopping in London early in December, 1960, a 71-year-old woman suddenly developed pain and stiffness in the back of the neck. It persisted for several days and was followed by aching in both thighs, which continued despite physiotherapy and phenylbutazone. Her hæmoglobin was 73% and E.S.R. 70 mm. in the first hour. Both shoulders became stiff, and when first seen in March, 1961, the patient was unable to raise her arms. She had no headaches, and her temporal arteries were normal. Her blood-pressure was 180/95 mm. Hg. She was given 20 mg. of prednisone daily with immediate benefit, and the dose has since been reduced to 10 mg.

The onset of symptoms was so sudden in these 3 cases that it could be timed almost exactly. Gordon (1960) stated that the disease struck suddenly, and 16 of his 21 patients were able to date the onset to within one or two days. These cases confirm that prednisone is more effective than phenylbutazone in relieving the symptoms.

Case 8.—In October, 1959, a 67-year-old woman developed pains in the neck, shoulders, and hips which were unrelieved by treatment with phenylbutazone. She felt ill, but had no headache or visual disturbance. When examined six weeks later she had restricted shoulder movements, and tender deltoid and neck muscles. Her temporal arteries appeared normal, the blood-pressure was 130/80 mm. Hg, and chest X-ray was normal.

Investigations.—Hb 82%, W.B.C. 9000 per c.mm., E.S.R. 83 mm. in the first hour, Rose-Waaler test negative.

Treatment and progress.—Within a week of starting 15 mg. of prednisone daily the patient said that she felt fine, but several attempts to withdraw treatment during 1960 failed. However gradually the dose was reduced, pains returned whenever less than 7·5 mg. of prednisone was given daily. In May, 1961, this was reduced to 5 mg. daily, and she remains well on this dosage in October, 1961 (Hb 86%, E.S.R. 27 mm. in the first hour).

Case 9.—A 74-year-old woman developed pain in the shoulders and neck in December, 1959. Physiotherapy for two months did not benefit her, and her knees and back began to ache. She was pale and could not raise her arms. Her father had suffered from gout, but she had no tophi, and the blood-uric-acid was 5·7 mg. per 100 ml. Her temporal arteries appeared normal and her blood-pressure was 250/120 mm. Hg.

Investigations.—Hb 69%, W.B.C. 10,000 per c.mm., E.S.R. 73 mm. in the first hour, Rose-Waaler test negative. Chest X-ray showed unfolding and calcification of the aorta.

Treatment and progress.—After 12 mg. of triamcinolone daily for a week the patient said the improvement was "remarkable". Three weeks later, taking 12 mg. daily, she was "thrilled", but during the next six weeks when the dose was reduced to 8 mg. daily she felt less well and had slight muscle pains. Steroid therapy was stopped a week later, and phenylbutazone was given instead for two weeks. The patient was then "a mass of pains and better-off dead", but she rapidly recovered when given 16 mg. of triamcinolone again. A further attempt to withdraw steroid therapy caused symptoms to return when the dose reached 8 mg. She remains well taking 8 mg. daily in October, 1961 (Hb 96%, E.S.R. 12 mm. in the first hour).

These cases illustrate the value of maintenance therapy with steroid drugs. Fortunately the critical dose is low, and the misery resulting from under-treatment offsets the slight risk of side-effects.

Case 10.—A healthy woman of 76 felt pain in the left shoulder suddenly in June, 1960. A week later her right shoulder became stiff, and the pain spread to her neck and right hip. She had anorexia, but no headache or fever. The pains did not respond to aspirin or phenylbutazone. Her knees began to ache in August, 1960, and the left joint showed a slight effusion.

Investigations.—Hb 88%, E.S.R. 25 mm. in the first hour.

Treatment and progress.—8 mg. daily of triamcinolone relieved the patient's symptoms, but in October, 1960, she experienced retrosternal pain for two hours, and was found to have developed a soft aortic diastolic murmur. The blood-pressure was unchanged (200/100 mm. Hg), and an E.C.G. was normal. Chest X-ray showed a normal heart outline with calcification and unfolding of the thoracic aorta. Her subsequent progress has been satisfactory, but if she takes less than 8 mg. of triamcinolone daily the pains and weakness recur. In February, 1961, her hæmoglobin was 99% and E.S.R. 10 mm. in the first hour.

The development of aortic incompetence in this case, in the absence of left ventricular failure or hypertrophy, suggests that the aorta itself was diseased. Apart from the retrosternal pain, there was no clinical evidence of dissection; but the aorta was radiologically wide. It is noteworthy that 7 other cases had slightly raised diastolic blood-pressures, and that routine radiological reports mentioned unfolding of the aorta in 5 cases.

Case 11.—A 70-year-old man developed painful stiffness of his shoulders in May, 1959. Six weeks later his buttocks and thighs began to ache and both hands became stiff. He looked well, but was febrile (temperature 99°F). Movements of his hips and shoulders were limited by pain, and the finger-joints of both hands were swollen and tender. The temporal-artery pulses were present and his blood-pressure was 180/90 mm. Hg.

Investigations.—Hb 70%, W.B.C. 8000 per c.mm., E.S.R. 108 min. in the first hour, plasma albumin 4·1 g., globulin 2·3 g. per 100 ml., Rose-Waaler test negative. Chest X-ray showed an enlarged heart. His symptoms failed to improve with preliminary aspirin and physiotherapy, and he refused further treatment.

The swelling of the hands in this case resembled rheumatoid arthritis; but the Rose-Waaler test was negative, as in the other cases in which it was performed. In 2 of the cases described by Gordon (1960) the finger-joints were swollen.

Case 12.—In June, 1959, a woman of 64 had six weeks' orthopædic treatment because her neck was painful and stiff. The pain became worse and spread to her head. Examined then, she was febrile and had inflamed tender nodules on both temporal arteries. Pulsation of these vessels was absent above the zygoma, although the blood-pressure was 210/120 mm. Hg. Her symptoms responded to 20 mg. of prednisone daily, and after three weeks the drug was slowly withdrawn. A week later both temporal arteries appeared normal and the scalp branches pulsated. Pains in the hips, shoulders, and thighs troubled the patient during the next three months. She found getting out of the bath and turning over in bed difficult, but no longer had headaches. Three months later she was better (Hb 90%, E.S.R. 51 mm. in the first hour), but limped because of pain in the left hip, and was unable to play golf. In October, 1960, recovery was complete.

This typical case of temporal arteritis is included to show that the skeletal symptoms are the same as in the other cases. The rapidity with which the pulse in the temporal arteries returned when the inflammation was arrested is interesting. Only 4 other classical examples of cranial arteritis were seen during this three-year period.

Discussion

Headache is a prominent symptom of typical cases of cranial arteritis, in which the temporal arteries are involved. The fact that these vessels are not affected in "polymyalgia rheumatica" may explain why headache is not a feature of this syndrome. The symptoms of the two conditions are otherwise the same, but ocular complications have not been recorded in "polymyalgia rheumatica" (Gordon 1960, Boyle and Beatty 1961), nor were they seen in the present series. The fact that temporal arteritis almost always precedes ophthalmic arteritis (Ross-Russell 1959) again may explain this difference. Failure to find histological changes in "polymyalgia rheumatica" is also not surprising, since evidence of arteritis is usually obtained from biopsy of the accessible temporal arteries. It is probably the vessels involved, rather than the disease which involves them, that is different in the two syndromes. Headache and visual disturbances are likely, and biopsy proof of the diagnosis is available, if the temporal arteries are affected; but when they are not, tenderness in the

region of the occipital arteries may be the only direct hint of arteritis, as in 2 of the present cases. Such selective involvement of arteries is curious and not easily explained.

A remarkable feature of giant-cell arteritis—and one not shared by rheumatoid arthritis and the collagen disorders—is the age of its victims. Its exclusive occurrence after the age of 45 suggests that, despite the histological evidence of inflammation, it is really a degenerative disease. Because of this age-distribution, extensive atheroma may coexist with arteritis (Paulley and Hughes 1960), and it is indeed often found. Many of the present cases had diastolic hypertension and aortic sclerotic murmurs, while unfolding and calcification of the aorta was a common X-ray finding. One patient developed aortic incompetence, and another personally treated case with aortic dilatation was subsequently found to have dissection of the aortic arch (*British Medical Journal* 1960). The association of aortic atheroma with arteritis may therefore be more than a coincidence.

The observation of a giant-cell reaction in relation to deposits of "soft" atheroma in the coronary arteries (Montgomery 1959) provides a possible link between the two conditions. In these arteries at least, atheroma can provoke a localised foreign-body reaction akin to that of arteritis. Macroscopic deposits of atheroma are not found in relation to the more diffuse changes of arteritis, but penetration of the vessel walls by small particles of this material might account for the giant-cell reaction there also. This could occur by microembolism of vasa vasorum after rupture of an atheromatous plaque of the aorta, thereby explaining the sudden onset of the disorder. Vessels arising from the aortic arch might be expected to be predominantly affected, and the usually bilateral, but curiously selective, involvement of arteries would also be understandable. Occipital arteritis produces stiffness and pain in the neck muscles, and it is likely that involvement of branches of the subclavian and iliac arteries likewise accounts for muscular pain in the shoulder and hip-girdles. This hypothesis is advanced to support the idea that "polymyalgia rheumatica" is giant-cell arteritis without headache and as an alternative to the concept that the disease is an autoimmune disorder (Kersley 1960), which its age-distribution scarcely suggests.

Summary

12 cases are described illustrating that the age-distribution, clinical pathology, and response to treatment of "polymyalgia rheumatica" and cranial arteritis are the same. The symptoms are also identical except that headache and vascular complications have not been reported in the polymyalgia syndrome.

An explanation of this single difference is offered and a common cause for the two disorders is tentatively suggested.

I am grateful to Dr. H. J. Anderson for help with case 1, and the late Dr. P. Ellman for clinical details of case 2.

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EXFOLIATIVE GASTRIC CYTOLOGY

Its Evaluation in the Diagnosis of Carcinoma of the Stomach

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To assess the value of exfoliative gastric cytology in the early detection of gastric neoplasia, we have analysed the records of all patients in the Royal Victoria Infirmary during 1958 and 1959, in whom a diagnosis of gastric carcinoma was conclusively proved. This diagnosis was made by histological examination of material taken either at operation or necropsy, and in all cases the exfoliated gastric cells were studied immediately before operation or death.

The Investigation

The series comprised 115 patients, whose ages ranged from 30 to 75, though most were in the seventh decade. There were 83 males and 34 females.

Smears of the gastric cells were prepared by the method of Schade (1958) who also examined them.

The patient had nothing to eat or drink for twelve hours before the specimen was taken. He was asked to expectorate saliva and to blow his nose, and a Levine tube no. 14 or 15 F (made of either plastic or rubber) was passed through the nose into the stomach, this being facilitated by his swallowing a mouthful of tap water as the tube was being passed. The stomach was then emptied using a 50 ml. syringe (specimen 1). Normal saline (200–300 ml.) was forcibly injected down the tube, and after a spigot had been inserted in the end of the tube the patient was shown how to move so as to wash the fluid around the stomach. This fluid was then aspirated, reinjected several times, and finally withdrawn (specimen 2).

Both specimens were centrifuged immediately, and the sediment was smeared on to a glass slide, and stained by Papanicolaou's (1946) method.

Results

As table I shows, in 74 (64%) of the 115 patients the initial smear revealed carcinoma cells, while in a further 23 (20%) cells were reported as either highly atypical or suggestive of malignancy. In other words, 84% had abnormal smears at the first attempt.

In 16 (14%) patients no malignant cells were seen; but in 4 of these with pyloric stenosis the picture was obscured by retained food particles. In 2 cases satisfactory material could not be obtained despite several attempts.

The barium-meal results in these patients are also presented in table I:

54 (47%) showed a filling defect indicative of carcinoma,

TABLE I—COMPARISON OF RESULTS OF GASTRIC CYTOLOGY AND BARIUM-MEALS IN CASES OF CARCINOMA OF STOMACH

Total cases with carcinoma of stomach	First specimen of gastric cells				Barium-meals			
	Malignant cells	Highly atypical cells	No malignant cells	Unsatisfactory	Carcinoma	Suggestive of carcinoma	No carcinoma	Not performed
115	74 (64%)	23 (20%)	16 (14%)	2 (2%)	54 (47%)	31 (27%)	20 (17%)	10 (9%)

TABLE II—ANALYSIS OF BARIUM-MEAL REPORTS IN EACH GROUP OF CYTOLOGICAL RESULTS

Results of cytology	Results of barium-meal examination			
	Carcinoma (54 cases)	Suggestive of carcinoma (31 cases)	No carcinoma (20 cases)	Not performed (10 cases)
Malignant cells (74 cases)	40 (54%)	15 (20%)	9 (12%)	10 (14%)
Atypical cells (23 cases)	10 (43%)	7 (30%)	6 (27%)	0 0
No malignant cells (16 cases)	3 (19%)	8 (50%)	5 (31%)	0 ..
Unsatisfactory material (2 cases)	1	1	0	0

while a further 31 (27%) suggested such a lesion. Thus 74% supported the clinical diagnosis.

20 patients (17%) had normal barium-meals; 3 of these had positive smears, and operation revealed an early carcinoma which had not penetrated the muscularis mucosæ.

The barium-meal reports in each cytological group are further analysed in table II. The most significant findings are in the 20 patients with normal barium-meals, because 15 of their cytological reports were abnormal—9 had positive smears, and 6 were "atypical". On the other hand, 11 of the 16 patients with normal smears had abnormal barium-meals—in 3 a carcinoma was demonstrated, and in 8 the appearances were suggestive of that diagnosis.

Because the exact origin of the gastric cells was not identifiable, we could not determine the accuracy of detecting carcinomas in different sites in the stomach. But during our investigation we found that a number of patients had abnormal smears—sometimes even with malignant cells—although they had no other evidence of a gastric neoplasm. The final diagnoses in these patients are shown in table III:

4 of the 5 patients with malignant cells in their gastric juice had a proven carcinoma elsewhere, which was presumably

TABLE III—FINAL DIAGNOSIS IN PATIENTS WITHOUT GASTRIC CARCINOMA BUT WITH ABNORMAL GASTRIC SMEARS

Final diagnosis	No. of patients	Cytology report		
		Malignant cells	Suggestive of malignancy	Highly atypical cells
Chronic gastritis ..	19	0	0	19
Simple gastric ulcer ..	2	0	1	1
Simple duodenal ulcer	1	0	1	0
Benign pyloric stenosis	2	0	1	1
Reticulum-cell sarcoma of abdominal glands	1	1	0	0
Hiatus hernia	1	0	0	1
Mesenteric-vein thrombosis	1	1	0	0
Steatorrhœa	2	0	0	2
Bronchogenic carcinoma	3	0	0	3
Pulmonary abscess ..	1	0	0	1
Malignant bronchœsophageal fistula ..	2	2	0	0
Œsophageal carcinoma	2	1	0	1
Totals	37	5	3	29

shedding its cells into the stomach. In the patient with mesenteric-vein thrombosis the cytological diagnosis was apparently erroneous.

3 patients had smears with a highly abnormal gastric flora which contained excess neutrophils and cells which were suggestive of malignancy though not frankly malignant. At operation the diagnoses were found to be simple gastric ulcer, duodenal ulcer, and benign pyloric stenosis.

Highly atypical cells indicative of intestinal metaplasia, but without mitotic figures, were found in the smears of 29 patients. Of these, 19 were provisionally diagnosed as having chronic gastritis, and this was confirmed by laparotomy in 5. A further 8 of these 19 patients had pernicious anæmia which had been treated for various periods.

As yet we have not had to revise any of these original diagnoses.

Discussion

Our findings indicate that examination of the exfoliated gastric cells is a helpful procedure in patients suspected of gastric carcinoma, because this may confirm the diagnosis or show abnormal features which suggest further investigations. These results compare favourably with those of other workers:

Panico et al. (1950) found that, in patients with known gastric neoplasms, the exfoliative gastric cytology gave a positive smear in only 30% of cases. This was increased to 84% by mechanical irritation of the gastric mucosa with a balloon, but this takes too much time for routine use.

Seybolt et al. (1951) found that a correct result was obtained by routine gastric washing in only 60% of patients; but Cooper and Papanicolaou (1953), again using a balloon, showed that with this abrasive atypical cells could be recovered in 89% of cases. Rosenthal and Traut (1951) and Rubin et al. (1953) used a mucolytic agent to try to preserve the malignant cells, but this does not seem to increase the accuracy materially.

Schade's technique (1958) is easy to perform, taking ten to fifteen minutes only, and it does not involve the use of an abrasive or a mucolytic agent; yet it has recovered abnormal mucosal cells in 84% of patients with gastric neoplasia.

Patients with pernicious anæmia have an increased liability to gastric carcinoma; most workers believe this to be about three times greater than that of the general population (Kaplan and Rigler 1945, 1947, Wilkinson 1949, Mosbech and Videbaek 1950). Because of this we are following a series of 250 pernicious-anæmia patients by examining their exfoliated gastric cells every six months. We hope to find whether this procedure helps to make an early diagnosis of carcinoma, and whether the examination of a single satisfactory specimen of the gastric cells, interpreted by an experienced cytologist, is reliable enough to be used as a routine investigation in patients with potentially malignant gastric changes.

Summary

Of 115 proven cases of gastric carcinoma, 84% had either malignant or atypical cells in the smear obtained from a first satisfactory gastric washing. In 74% of the same cases barium-meal examinations either showed a carcinoma or they were suggestive of one.

In 37 patients without gastric carcinoma atypical cells were found.

We wish to thank all the consultant staff of the Royal Victoria Infirmary for allowing us to use their case-records, and Dr. R. B. Thompson for his criticisms. One of us (M. F. R.) is in receipt of a grant from the British Empire Cancer Campaign.

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STAPHYLOCOCCAL INFECTION OF THE SPINE

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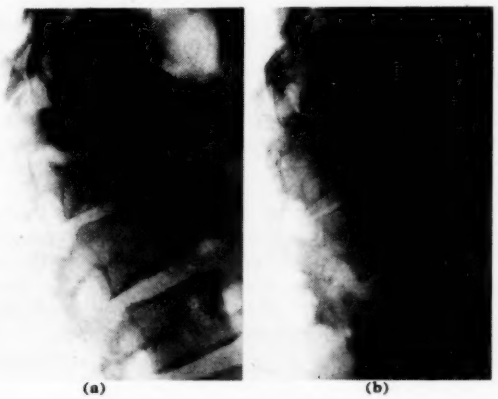
DESCRIPTIONS of this disease suggest a very serious illness with a high mortality-rate. Butler et al. (1941) studied 16 patients, 15 of whom died. We have studied 15 patients with this condition, in 12 of whom the disease is now apparently completely quiescent and healed. 2 are still inpatients, and in 1 a small sinus occasionally discharges though in all other ways she is well. In 5 cases the diagnosis was proved beyond reasonable doubt, and in the other 10, the clinical, radiological, and pathological picture left us in little doubt of the diagnosis (but see footnote to table). In the second group, bacteriological proof was lacking, but many of the patients had previously received streptomycin on the assumption that the lesion was tuberculous. Material obtained at operation, however, failed to provide evidence of tuberculosis and suggested a pyogenic infection. In some patients there was also serological evidence of staphylococcal infection. It is clearly vital to distinguish between these two infections both from therapeutic and prognostic viewpoints; and a social stigma may still be associated with tuberculosis.

Staphylococcal infection differs from tuberculosis in the evolution of the disease and in the final result.



(a) (b)

Case 11: (a) Staphylococcal infection of spine involving T12L1 with destruction of disc between; (b) complete fusion a year later (fusion first apparent at nine months).

Tuberculosis goes through a long cycle of destruction unaccompanied by new bone formation, and does not become quiescent for at least a year, even with modern therapy. Bony ankylosis of the affected vertebræ is rarely seen at the end of this time. The march of events in pyogenic infection is more rapid—the onset is more acute, and the cycle is usually completed in about six months to a year (Guri 1946). By then firm bony fusion may have finally arrested the disease.

Staphylococcal spinal infection in the adult differs considerably from the same condition in the child (Pritchard and Thompson 1960). In children, the onset is usually very stormy, and the condition is variously diagnosed as acute poliomyelitis, perinephric abscess,

FIFTEEN PATIENTS TREATED FOR STAPHYLOCOCCAL INFECTION OF THE SPINE

Case	Age	Sex	Presentation			Treatment	Result
			Symptoms	E.S.R. (mm. in 1 hr.)	White count (per c.mm.)		
1	15	M	Backache and pyrexia	24	4000	Exploration	Well, with new bone formation at three months.†
2	62	F	Backache	55	9000	Exploration	Well, with fusion at three months (D 6–7), new bone at three months. (D 3–4).*
3	36	F	Backache and pyrexia	59	5000	Exploration	Occasionally discharging sinus and incomplete fusion, otherwise well at three years.†
4	66	F	Backache and pyrexia	43	11,000	Exploration	Well, Progressive new bone, but incomplete fusion at one year.†
5	15	M	Drop foot and pyrexia	14	5000	Exploration	Well. Drop foot persists at two months from operation. No radiological improvement.*§
6	47	F	Psoas abscess and backache	64	3000	Drainage	Well. Fusion at seven months.†
7	65	F	Paraplegia and pyrexia	62	7000	Exploration	Well. Fusion at one year. Complete recovery from paraplegia except slight impairment of position sense.†
8	68	M	Meningitis, pyrexia and backache	59	7000	Exploration	Well. Fusion at six months.‡
9	54	M	Backache	46	5000	Recumbency	Well. Fusion at eight months.‡
10	31	F	Backache, cystitis and pyrexia. Paraparesis	—	10,000	Exploration	Well. Transferred elsewhere at two years.‡
11	48	F	Backache	38	7000	Recumbency	Well. Fusion at nine months.†
12	61	F	Backache and pyrexia	15	7000	Exploration	Well. Fusion at one month.‡
13	49	M	Sciatica, buttock abscess	80	20,000	Aspiration and recumbency	Well. New bone and progressive sclerosis at 3 months.†
14	54	M	Pneumonia, quadriplegia	22	11,000	Exploration	Well. Complete recovery from tetraplegia. New bone at one month, fusion at two years.‡
15	26	M	Backache, paraplegia	16	6000	Exploration	Well. Fusion at nine months, complete recovery of paraplegia.†

*=Under treatment. †=Observation continues. ‡=Discharged.

§ Since we prepared this paper, what was thought to be a recurrent abscess was reopened, and biopsy identified the condition as a reticulum-cell sarcoma. *Staph. aureus* cultured from an earlier biopsy may have been a contaminant. It is significant that this case was the only one to show no radiological improvement.

meningitis, or suppurative arthritis of the hip (this latter diagnosis is made because of high pyrexia, toxicity, and severe muscle spasm around the hip, due in fact, to irritation of the psoas). In adults, the onset is usually more gradual, though occasionally, as in the first patient described here, the first signs suggest meningitis.

In children, recovery is usually complete and the intervertebral disc space is preserved; but in adults firm bony fusion with obliteration of the disc space is the rule.

The accompanying table gives the salient features of the 15 cases, and 2 are described below in detail. In the first, the diagnosis was definitely established, and in the second we felt quite confident of the diagnosis, although direct bacteriological proof was lacking.

Case-reports

Case 8.—A man now aged 68 was admitted to hospital on Sept. 19, 1954, and a diagnosis of meningitis was made. He improved after a course of antibiotics but pain in the lower dorsal region persisted. X-rays showed a destructive lesion of the 8th and 9th dorsal vertebræ with diminution of the disc space and perispinal swelling. There was no weakness or sensory change in the lower limbs, but the reflexes in the left leg were exaggerated. The white-cell count was 7000 per ml. and erythrocyte-sedimentation rate (Westergren) (E.S.R.) 59 mm. in the hour.

A plaster bed was made for the patient, and it was decided to explore the vertebral lesion. Through an anterolateral approach, no abscess cavity was found, but the bone of the affected vertebræ was definitely necrotic. A swab was taken and diseased bone removed. The swab showed "occasional pus cells and numbers of gram-positive cocci". Culture gave a heavy growth of *Staphylococcus aureus*.

He made a good recovery and soon became apyrexial. Tetracycline was given for two weeks, starting the day before operation. A month after the exploration, the E.S.R. fell to 20 mm. and remained at this level until the last reading was made six months later. Bony fusion was evident between the affected vertebræ six months after operation, and he was then walking with a posterior spinal support.

When last seen two-and-a-half years later, his condition was very satisfactory.

Case 12.—A married woman now aged 61 was first seen on March 20, 1957. She had been transferred from Kenya, where, seven months before she was admitted to hospital with backache. She had been found to have a mild lower dorsal scoliosis, but no other clinical details were available. In Kenya she was given a course of oral streptomycin and discharged after six weeks, still with pain. A course of heat and massage alleviated her symptoms, but she felt persistently tired. A further X-ray showed a destructive lesion in the bodies of the 9th and 10th dorsal vertebræ. A plaster jacket was applied, and she was transferred by air to this country.

Her general condition was good, and there was no local tenderness in the back. Lower limb reflexes were brisk but there were no sensory changes or muscle weakness. X-rays showed gross destructive changes in the 9th and 10th dorsal vertebræ, with collapse and increased density, and a paravertebral shadow. The white-cell count was 7000 per c.mm., and the E.S.R. was 15 mm. in the first hour. It was decided that the lesion was probably tuberculous, and she was put on a course of streptomycin, *p*-aminosalicylic acid (P.A.S.), and isoniazid.

A month later her general condition was excellent, and X-rays suggested that the affected vertebræ were fusing. Nevertheless, it was decided to explore the lesion, and this was done through an anterolateral approach. No abscess was found, but portions of bone were removed from the involved vertebræ. Examination of the fragments showed calcification of cartilage and some newly formed bone. There was no evidence of tuberculosis.

Her convalescence was uneventful and she was allowed to get up with a spinal support six weeks after operation. She was discharged from hospital eight weeks after operation, and X-rays shortly afterwards showed sound bony fusion of the affected vertebræ. She has remained well and active since then.

Discussion

All except 4 patients were operated upon, because we believe it is important to explore the lesion when a staphylococcal infection is suspected. When large abscesses are found they are, of course, drained, but on the whole they are rare, and the more usual findings are small collections of pus and necrosis of vertebræ.

After exploration, all our patients were treated in a plaster bed and given antibiotics. They were allowed up when the clinical and radiological findings indicated quiescence of the disease. The white count was seldom very high at the onset of the infection; but the E.S.R. was high in all but 4 cases.

Serological tests were not done routinely, but there is evidence that a combination of the anti-alpha-hæmolysin titre and the anti-leucocidin tests described by Panton and Valentine is of diagnostic value (Towers and Gladstone 1958).

Summary

15 patients were treated for pyogenic osteomyelitis of the spine. The mortality was nil and in 12 the disease is apparently completely quiescent and healed. The differences between the evolution and prognosis of this disease and those of spinal tuberculosis are pointed out.

We should like to thank Mr. H. Osmond-Clarke, Mr. D. Ll. Griffiths, Mr. G. K. Rose, Mr. Robert Roaf, and Mr. T. McSweeney for permission to study their patients. We are also grateful to Mr. Robert Roaf and Mr. R. S. Cowie for their help with this paper; and we are indebted to Mrs. M. Jackson, research secretary, for her assistance.

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THE D-ANTIGEN CONTENT IN POLIOVACCINE AS A MEASURE OF POTENCY

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AN accurate and reliable method of measuring the immunising antigen in inactivated poliovaccine would be of great value, particularly if it could be performed rapidly in vitro. It would permit an accurate control of potency and would also allow measured amounts of the three types of poliovirus to be incorporated, so that the type-1 response should equal those of the other two components, which are already satisfactory. The animal potency tests at present available are inaccurate; moreover, they take too long to be used conveniently for control of vaccine blending. One solution to this problem is to measure the amount of virus by physical and chemical methods and on this basis to add known weights of the three types of poliovirus to the vaccine. This method demands highly purified concentrated poliovirus, but has been developed in the manufacture of 'Purivax' (Charney et al. 1961).

Another solution is to measure the required antigen

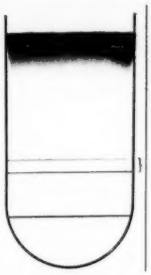

Fig. 1—Sucrose density gradient: poliovirus type $10^{9.5}$.

serologically. Poliovirus preparations contain two type-specific antigens detectable in precipitin and complement-fixation tests. These antigens are called D and C (Le Bouvier et al. 1957, Mayer et al. 1957) or N and H (Hummeler and Hamparian 1958). The D antigen is named after a zone in a sucrose density gradient that contains this antigen and most of the virus infectivity (Schwerdt and Schaffer 1956) (fig. 1); the C zone contains little infectivity. The virus in the D zone appears intact in electron micrographs and contains 20–25% ribonucleic acid (R.N.A.), whereas that in the C zone is damaged and contains little or no R.N.A. (Schwerdt 1957). Mayer et al. (1957) have shown that there is a constant relationship between the amount of D antigen, measured by complement-fixation, and the number of intact physical particles of poliovirus, counted by electron microscopy. Hummeler and Hamparian (1958) prefer to call the two antigens N and H, native and heated, because the physical attributes of the particles in the D and C zones may not be shared by all antigen reacting as N or H, respectively. It has been, however, found that heat changes N or D preparations from complete virus particles to " empties " when viewed in the electron microscope by the phosphotungstic-acid technique (Brenner and Horne 1959). This was clearly shown in the experiment, summarised in table I, performed in collaboration with Dr. J. Nagington and Mr. R. W. Horne.

Certain treatments are known to destroy the capacity of poliovirus to produce neutralising antibodies. Three

TABLE I—APPEARANCE OF LIVING (N OR D) AND HEATED (H OR C) POLIOVIRUS ANTIGENS IN THE ELECTRON MICROSCOPE

Sample	" Full "	" Empty "	Serological type
Living virus	118	4	D
Living virus heated at 56°C for 15 minutes	0	77	C

of these are heat, freeze-drying, and addition of thiomersal in the presence of metal ions. All three treatments change the preparations' reactivity from D to C (Le Bouvier 1959b). Indeed, it seems almost certain that, as Le Bouvier (1959b) believes, D is converted to C. On the other hand, treatments that destroy the infectivity but preserve the capacity to produce neutralising antibodies, for example ultraviolet light or addition of formalin, do not convert the D antigen to C under similar conditions (Le Bouvier 1959b, Beale and Mason 1962). It has also been found that, when sodium edetate is added as well as thiomersal, the antigenicity of poliovaccine is preserved (Davisson et al. 1956) and the D to C conversion is also retarded or prevented (Le Bouvier 1959b). Hummeler and Hamparian (1958) found that native (D) antigen adsorbed both anti-D and neutralising antibodies from sera, whereas C antigen only adsorbed anti-C.

It would, therefore, seem that measuring the D-antigen content of poliovaccine should provide a reliable indication of its potency. Moreover, since living poliovirus preparations contain varying proportions of non-infectious D antigen, depending on their exact conditions of growth, this may be a more reliable guide than infectivity for selecting virus pools suitable for inactivation, as has been suggested by Mayer et al. (1957). Unfortunately, the measurement of D antigen by complement-fixation is not easy, since pure anti-D sera are rare, although it has been used successfully (Mayer et al. 1957). The pitfalls of using complement-fixation without pure anti-D sera for this purpose are illustrated by the work of Warren et al. (1959), who found the titre of poliovirus antigen to be

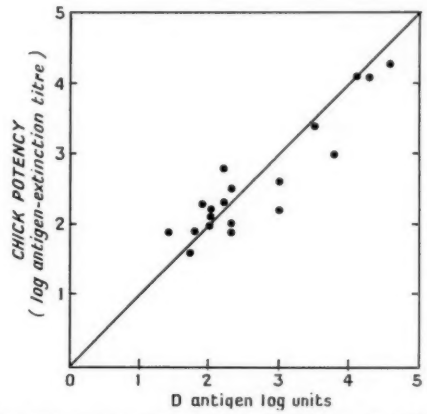

Fig. 2—Poliovaccine type-1 potency assessed by two techniques.

unaltered after freeze-drying, although the potency was destroyed. Le Bouvier (1959a) has shown how D antigen can be measured with a mixed anti-D and C serum by diffusion in agar gel, since the concentration of D antigen is proportional to the distance the antigen diffuses through agar to form a precipitate with antiserum. An accurate standardised micromethod for performing these estimations has recently been evolved (Beale and Mason 1962).

Determinations of the D-antigen content of various poliovaccines have been made and compared with their potency by the antigen extinction technique of Gard et al. (1956) on 15 three-week-old chicks (Light Sussex/Rhode Island Red cross) with 0·5 log dilutions of vaccine. Each chick received 0·5 ml. of vaccine dilution intramuscularly and was bled 5 days later. Individual sera were screened at 1/16 against the three types of poliovirus, and the antigen extinction endpoint was calculated by the Kärber method. Fig. 2 shows the results of comparing the potency of the type-1 antigens of 19 poliovaccines by both techniques. The D antigen is expressed in terms of arbitrary units such that an antigen giving a D line of 22 mm. after 300-fold concentration (Beale and Mason 1962) contains 100 units. The graph shows reasonable agreement between the two tests, although the D antigen gives a low estimate of potency for samples with chick potencies of $10^{-2.5}$ or less. This could be due to slight losses of D antigen that may occur during the concentration required before determining its amounts in these preparations.

It is possible by means of the D-antigen assay to control the potency of the three types of killed poliovaccine (table II). The table relates to four poliovaccines, one of normal strength (D) and the others concentrated approximately ten-fold, either by adsorption on and elution from aluminium phosphate (Fantes 1962) or by using increased cell-to-fluid ratios for harvesting the virus. The chick potency was predicted by the kind of correlation shown in fig. 2; in general, the predicted value agreed with the observed potency. The type-1 potency of normal vaccine in chicks is lower than types 2 and 3, a pattern of response shown in man. It is also clear from these results that, by concentrating solely the type-1 component, vaccine of equal chick potency for all three types can be made. It is presumed that such vaccine would also give an equally good response for all three types in man.

TABLE II—PREDICTED AND OBSERVED CHICK POTENCY TITRES OF POLIOVACCINE

Vaccine	Type 1		Type 2		Type 3	
	Predicted	Observed	Predicted	Observed	Predicted	Observed
A	3·4	2·9	4·2	4·2	4·2	4·0
B	3·2	3·5	4·5	4·3	4·5	4·3
C	3·2	3·0	4·0	4·9	4·0	4·7
D	2·0	2·2	3·0	3·3	3·0	3·6

Titres expressed as log antigen-extinction titre.
Predicted titres based on D antigen content.

There is thus good evidence to correlate D-antigen content of poliovaccine with potency. It has so far proved impossible to separate D-antigen-containing preparations from those capable of eliciting neutralising antibodies, but there is clearly the possibility of D antigen reacting with antibody but being incapable of eliciting an antibody response. At present such D hapten cannot be detected, although Roizman et al. (1958) have described D antigen in the C zone in the sucrose density gradient. C antigen appears when virus is degraded, but no D hapten is detectable even with a concentrated purified preparation.

Smith et al. (1959) and Eggers and Sabin (1961) have found that there is little correlation between the amount of precipitating antibody in sera and their neutralising antibody titre. Both these groups of workers conducted their tests in fluid rather than agar gel. This discrepancy is probably explained by the work of Smith (1961), who found that sera with high titres of neutralising antibodies not forming precipitates none the less block the precipitation that would otherwise occur between appropriate poliovirus preparations and rabbit antisera.

Thus it appears possible to control the potency of killed poliovaccine by D-antigen assay, so that, by increasing the ratio of cells to fluid, with methods similar to those described by Taylor-Robinson et al. (1961) and Sheffield and Churcher (1957), or by concentration of virus, vaccine of any required potency can be made.

Dr. J. Nagington, of the Public Health Laboratory, and Mr. R. W. Horne of the Cavendish Laboratory, Cambridge, kindly helped with the experiment reported in table I. I also acknowledge gratefully the help given by Mr. P. J. Mason and Mr. J. H. Green in carrying out the experiments on which this paper is based.

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RECURRENCE OF STAPHYLOCOCCI OF SAME PHAGE-TYPE FOLLOWING CONTROL OF NASAL CARRIERS WITH NEOBACRIN AND SOFRAMYCIN

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Many persons both in the hospital environment and in the general population are nasal carriers of *Staphylococcus aureus* (Martin et al. 1960, McDermott 1956, Shooter et al. 1956, Weinstein 1959), and it is generally accepted as good hospital practice to try to reduce the prevalence of nasal carriage of staphylococci (*Lancet* 1958). More recently, the importance of nasal carriage in autoinfection has been stressed (Weinstein 1959, Rountree et al. 1960). In this hospital it was found that of 50 patients 14 were carriers on admission, and that of 196 patients 65 were carriers immediately preoperatively (Jarvis 1961). In the past, staff of this hospital who developed staphylococcal lesions and were nasal carriers of staphylococci of the same phage-type as that causing the infection were treated with 'Neobacrin' ointment to control the nasal carrier state. Because of the reported isolation of *Staph. aureus* resistant to neomycin (Quie et al. 1960) and the high percentage of staff who yielded a positive nasal swab soon after treatment, it was decided to compare neobacrin ointment with 'Soframycin' spray.

Methods

Before the start of the trial, 60 strains of *Staph. aureus* isolated from lesions in patients and staff during routine laboratory work were tested for resistance to soframycin and were found to be sensitive.

Nasal swabs were taken from the entire nursing staff of 300. From 110 nurses whose swabs yielded *Staph. aureus*, 90 were selected at random and allocated to one of three treatments. Of these 90 nurses 66 yielded two successive positive swabs immediately before treatment. The remaining 24 were not included in the trial. The three treatments were:

(1) Neobacrin ointment, containing neomycin 5 mg. and bacitracin 500 units per g.

(2) Soframycin spray, containing framycetin 1·25% and gramicidin 0·005% in buffered isotonic saline, without decongestant.

(3) Isotonic saline solution as a control.

The aim of the trial was explained to each nurse, and she was instructed to use the treatment three times daily for seven days. Neobacrin was applied with a swab to both anterior nares. Soframycin and saline were each applied with a nebuliser, which was squeezed sharply into each nostril twice at each

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treatment. Swabs were taken immediately before treatment began, the day after cessation of treatment, and twelve days after cessation of treatment. Nasal swabs were taken by moistening a sterile cotton-wool swab in 10 ml. of 10% saline broth, and rotating the swab three times in the right anterior nares. The swab was replaced in the broth, which was incubated at 37°C for twenty-four hours and plated on blood-agar. In our experience saline broth yields a higher percentage of positive swabs than direct plating on blood-agar. Colonies of *Staph. aureus* were identified by appearance and coagulase test, and were phage-typed.

Phages used were:

Group I.—29, 52, 52A, 79, 80.
Group II.—3A, 3B, 3C, 55, 71.
Group III.—42E, 6, 7, 47, 53, 54, 75, 77.
Group IV.—42D.
Miscellaneous.—187, 81, A77.

Non-typable strains were retyped at 1000 times routine test dilution. Throughout this paper "staphylococcus" refers to coagulase-positive *Staph. aureus*. The term positive indicates the isolation of staphylococci.

Results

Table I shows the results of nasal swabs taken the day after cessation of treatment. The difference between the

TABLE I—SWABS TAKEN 24 HOURS AFTER CESSATION OF TREATMENT

Treatment	No. of swabs		No. treated
	Positive	Negative	
Neobacrin	4	17	21
Soframycin	3	20	23
Saline control	19	3	22

number of positive swabs obtained after soframycin treatment and application of saline is statistically highly significant ($\chi^2=22{\cdot}9$). There is no significant difference between the number of positive swabs obtained after soframycin treatment and neobacrin treatment ($\chi^2=0{\cdot}003$).

Table II shows the results of swabs taken twelve days after cessation of treatment from nurses who yielded negative swabs twenty-four hours after cessation of treatment. There is no significant difference between the number of positive swabs obtained after the two treatments ($\chi^2=2{\cdot}3$).

Table III gives the phage-types of staphylococci isolated immediately before the three treatments. Assuming that the non-typable strains remained unchanged, 11 of the 12 nurses in the soframycin-treated group who were recolonised yielded the same strain of staphylococcus before and after treatment. In the neobacrin-treated group 12

TABLE II—SWABS TAKEN 12 DAYS AFTER CESSATION OF TREATMENT

Treatment	No. of swabs			Recolonisation-rate (%)
	Positive	Negative	Total	
Neobacrin	15	2	17	88
Soframycin	12	8	20	60

of the 15 nurses who were recolonised yielded the same strain. Thus of a total of 27 nurses who were recolonised, only 4 showed a change in phage-type.

TABLE III—PHAGE-TYPES OF STAPHYLOCOCCI ISOLATED IMMEDIATELY BEFORE TREATMENT

Treatment	Type						
	Gp. I	Gp. II	Gp. III	Misc.	80/81	Non-typable	Total
Neobacrin ..	3	2	0	0	7	9	21
Soframycin ..	3	0	2	4	6	8	23
Control ..	2	2	5	3	5	5	22

Discussion

In recent years increased importance has been attached to the role of nasal staphylococci in initiating auto-infections, and particularly postoperative infections.

Martin et al. (1959) treated carriers with various antibiotics and concluded that none of the procedures tested was very effective in reducing the nasal carrier rate. Gould (1957) considered that 80% of infections were autogenous, and tested numerous antibiotic preparations as means of reducing nasal staphylococci. He concluded that, during the period of application of antibiotic preparations, 90% of carriers were free of staphylococci, but after using the "lesser-used" antibiotics (neomycin and bacitracin) the great majority of carriers were recolonised within four weeks. Tulloch et al. (1960) stressed the value of treating the nasal carrier state in chronic furunculosis, but found that complete suppression of the nasal carriage state was often slowly, and sometimes only temporarily, achieved. More recently Stratford et al. (1960) conducted a trial of several antibiotic preparations to eliminate nasal staphylococci. They concluded that soframycin was the most effective of those tested, and that, although recolonisation was common after all treatments, it took longest after soframycin. They suggested that recolonisation after soframycin was due to exogenous sources, and that elimination of the carrier state was complete in the soframycin-treated group. In the absence of phage-typing, they were unable to verify these conclusions.

The present findings confirm that both neobacrin ointment and soframycin spray are highly effective in reducing the number of nasal carriers detected twenty-four hours after cessation of treatment; but twelve days after cessation of either treatment the majority of nasal carriers again yielded positive swabs. The recolonisation-rate of 60% after soframycin is not much different from that of 50% found by Stratford et al. (1960). Our findings suggest, however, that recolonisation is not due to exogenous sources of staphylococci in either treatment group. Of the 27 nurses recolonised, 85% yielded staphylococci of the same phage-type before and after treatment. That this is not due to the predominance in the environment of any one strain of staphylococcus is evident from table III. We suggest that apparent recolonisation is in fact persistence of the carrier state. The possibility that recolonisation is due to the carrier infecting himself from other sites should not be overlooked; but, since not all nasal carriers are carriers in other sites it seems more likely that the organisms persist in the nose, and are not detected by even the deep swabbing method used by Stratford et al. (1960). The results of sensitivity tests carried out on staphylococci isolated in the hospital suggest that persistence of the carrier state is not due to organisms being resistant to soframycin. We believe, therefore, that failure of either treatments to eliminate nasal staphylococci completely is due to inadequate contact between the antibiotic and all the colonised areas. The improved penetration by a spray, compared with an ointment, is in fact reflected in the longer time taken for recolonisation after soframycin, as found by Stratford et al. This was not revealed in our trial, since no swabs were taken between the day after treatment and the twelfth day after treatment. But our findings suggest that even this improved penetration is inadequate.

Either neobacrin ointment or soframycin spray would be suitable where it is desirable to suppress the carrier state for a definite period—e.g., preoperatively or during an outbreak of infection. Neither treatment is adequate where permanent removal of the carrier state is desired. However, neither treatment is arduous to apply, and the application of such treatment may well have a place in

control of staphylococcal infections, provided its limitations are kept in mind. Henderson and Williams (1961) have shown that nasal sterilisation of alternate patients alone will not reduce infection-rates, but sterilisation of all possible carrier sites simultaneously appears to be effective (Cope et al. 1961).

Summary

'Neobacrin' ointment and 'Soframycin' spray have been tested in the treatment of nasal carriers of *Staphylococcus aureus*.

Either preparation effectively suppresses nasal staphylococci so long as application is continued.

The high rate of recolonisation with staphylococci of the same phage-type after either treatment has been discontinued suggests that the original organism has survived, and that neither treatment will completely eliminate the carrier state.

We would like to thank Dr. K. Archer, Dr. T. H. Pullar, and Dr. W. Kenealy for their help and advice. We are greatly indebted to the matron and nursing staff for their cooperation and to Mr. A. C. Glenday, applied mathematics department, Department of Scientific and Industrial Research, for statistical advice. 'Soframycin' was kindly supplied by Roussel Laboratories Ltd., and 'Neobacrin' by Glaxo Laboratories (N.Z.) Ltd. One of us (A.W.J.) was aided by a grant from the Palmerston North Medical Research Foundation.

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TRACHEOTOMY FOR ACUTE RESPIRATORY INFECTIONS IN EMPHYSEMA

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"Of all the surgical operations which are performed in man for the preservation of his life by the physician, I have always judged to be the foremost that by which man is recalled from a quick death to a sudden repossession of life. The operation is the opening of the aspera arteria by which patients, from a condition of suffocating obstruction to respiration suddenly regain consciousness, and draw again into their heart and lungs that vital æther, the air, so necessary to life, and again resume the existence which had been all but annihilated."—FABRICIUS (1537–1619).

THE emphysematous patient who develops an acute respiratory infection constitutes a medical emergency. Infection causes the accumulation of excessive secretions within the bronchial tree. This gives rise to hyperpnœa with hypoventilation producing hypoxia and hypercapnia leading to mental changes, coma, and ineffective cough. Secretions thus accumulate further, and a vicious cycle is maintained.

We believe that tracheotomy has an important place in the management of this syndrome. It offers the following advantages:

1. Secretions may readily be aspirated.

2. Dead space is reduced, leading to increased ventilation for less respiratory effort.

3. Oxygen requirements are lowered because of the reduction in dead space and the diminution in respiratory muscular activity.

4. Excess carbon dioxide (CO_2) is "blown off" as a result of improved ventilation and removal of secretions.

5. Should artificial ventilation be required, intermittent positive-pressure respiration (I.P.P.R.) is facilitated.

We record here our experience with 16 patients in whom we considered tracheotomy necessary.

Case-records

The essential features of each of the 16 cases are shown in the accompanying table. The patients represent 5·5% of 293 admissions for acute respiratory illness between March 1, 1960, and Feb. 28, 1961.

SUMMARY OF 16 CASES OF EMPHYSEMA WITH ACUTE RESPIRATORY INFECTION REQUIRING TRACHEOTOMY

Case no.*	Age (yr.)	Clinical features	Comments
1	55	Pneumococcal pneumonia	Tube out 15th day
2	50	Bronchopneumonia. Coma with 100% O_2	Dramatic improvement with only 30 min. assisted manual ventilation with CO_2 absorber. Tube out 6th day
3	52	Staphylococcal lung abscess	Tube out 26th day
4	68	Bronchopneumonia. Mental confusion with 100% O_2	Sudden death 6th day of I.P.P.R. Necropsy refused
5	55	Bronchopneumonia. Rt ventricular failure	Tube out 37th day
6	38	Purulent bronchitis. Stupor with 100% O_2	Tube out 20th day
7	63	Pneumococcal pneumonia	Tube out 16th day
8	55	Purulent bronchitis. Stupor with 100% O_2	After 24 hours' I.P.P.R. conscious with arterial pCO_2 37. Sudden death at 36 hours. Necropsy: obstructive bronchitis and bronchiolitis, gross emphysema, rt ventricular hypertrophy
9	51	Purulent bronchitis	Sudden death after 24 hours I.P.P.R. Necropsy: obstructive bronchitis and bronchiolitis, gross emphysema, bronchiectasis lt lower lobe, rt ventricular hypertrophy
10	65	Purulent bronchitis. Drowsy with 100% O_2; arterial pCO_2 65. Atrial fibrillation	Assisted ventilation with cuirass-type respirator. Tube out 7th day. Final arterial pCO_2 39
11	60	Bronchopneumonia. Arterial pCO_2 28	Tube out 7th day
12	46	Bronchopneumonia. Stupor with 100% O_2. Arterial pCO_2 44	Tube out 36th day. Relapse of staphylococcal infection 43rd day requiring reinsertion. Subsequent intractable cor pulmonale. Died 74th day. Necropsy: bilateral upper lobe tubercle, emphysema, rt ventricular hypertrophy
13	68	Bronchopneumonia. Stupor with 25% O_2. Arterial pCO_2 59	Arterial pCO_2 45 few hours after tracheotomy. Tube out 20th day. Final pCO_2 41
14	47	Purulent bronchitis. Coma with 100% O_2. Arterial pCO_2 85	Sudden death after 24 hours' I.P.P.R. Necropsy: obstructive bronchitis and bronchiolitis, gross emphysema, biventricular hypertrophy
15	63	Purulent bronchitis. Arterial pCO_2 35	Tube out 8th day
16	62	Bronchopneumonia. Coma with 100% O_2 arterial pCO_2 60	Rapid improvement with 3 hours' I.P.P.R. arterial pCO_2 48. Tube out 9th day. Final pCO_2 36

* All males except case 4.

Some illustrative cases will be described in more detail:

CASE 2: RAPID RECOVERY FROM CO_2 NARCOSIS WITH MANUAL RESPIRATION

A man, aged 50, who had had a right thoracoplasty eighteen months earlier, was admitted with bronchopneumonia. He was stuporous and delirious, was sweating profusely, and had a tachycardia of 120 a minute.

Treatment.—He was given aminophylline and hydrocortisone intravenously with penicillin and streptomycin intramuscularly.

Course.—Oxygen relieved the cyanosis but deepened his stupor. Tracheotomy was then performed and large quantities of secretion were aspirated, after which oxygen again increased his stupor. Hyperventilation was then carried out by hand using a CO_2 absorber. After thirty minutes he had stopped sweating, his colour was good, and his mental state was normal. Next morning he sat up and ate bacon and eggs for breakfast.

CASE 10: RECOVERY FROM CO_2 NARCOSIS WITH A CUIRASS RESPIRATOR

A man, aged 65, with a long history of chronic bronchitis, was admitted with acute purulent bronchitis, atrial fibrillation, and signs of right ventricular failure.

Treatment.—He was given penicillin plus streptomycin, digitalis, chlorothiazide, and aminophylline.

Course.—When given oxygen he became drowsy and developed flapping tremor of the hands. Estimated arterial pCO_2 by the rebreathing method (Campbell and Howell 1960) was 65 mm. Hg. Tracheotomy was performed, secretions were aspirated, and he was placed in a cuirass-type respirator. Oxygen was administered via the tracheotomy tube while he was being ventilated. Four hours later his estimated arterial pCO_2 was 25 mm. Hg, but he rapidly became cyanosed if left without added oxygen. During the next four days he was left out of the respirator for varying periods, his estimated arterial pCO_2 ranging from 39 to 62 mm. Hg. From the fifth day assisted ventilation was no longer required. Five weeks later he was free from evidence of congestive failure, his heart size had returned to normal, and his estimated arterial pCO_2 was 39 mm. Hg.

CASE 13: RECOVERY FROM CO_2 NARCOSIS WITHOUT ASSISTED VENTILATION

A man, aged 68, with twenty years' history of chronic bronchitis, was admitted with bronchopneumonia.

Treatment.—He was given penicillin plus streptomycin, aminophylline, and isoprenaline.

Course.—When given 25% oxygen he became stuporous and his estimated arterial pCO_2 was 59 mm. Hg. Tracheotomy was performed, thick secretions were aspirated, and oxygen was administered via the tracheotomy tube. His mental state rapidly cleared and his pCO_2 fell to 45 mm. Hg. Six weeks later, when he was radiologically clear and his sputum mucoid and free from pathogenic organisms, his estimated arterial pCO_2 was 41 mm. Hg.

CASE 14: SUDDEN DEATH AFTER INITIAL RESPONSE TO I.P.P.R.

A man, aged 47, with chronic bronchitis, had been admitted with acute purulent bronchitis and right ventricular failure.

Treatment.—He was given oxytetracycline, digoxin, chlorothiazide, isoprenaline, and ephedrine.

Course.—After initial improvement he suddenly lapsed into coma. He was then given intravenous methicillin, aminophylline, and hydrocortisone, followed by intramuscular digoxin, mersalyl, and methicillin, oral prednisone, and intramuscular desoxyribonuclease. His estimated arterial pCO_2 at this time was 44 mm. Hg. During the next few hours he became alert and rational. Oxygen was given via a nasal catheter at 2 litres per minute; forty-eight hours later his estimated arterial pCO_2 had risen to 68 mm. Hg. Next day it had risen to 75 and he was again unconscious. Tracheotomy was performed and thick secretion aspirated. With manual respiration using a CO_2 absorber pCO_2 fell to 38; ten minutes of oxygen without artificial ventilation sent the figure up to 85. He was then put on artificial ventilation with an automatic I.P.P. machine. He was fully conscious by this time and would not accept the machine, although fully cooperative and well oxygenated when manually respirated. It was necessary to sedate him with morphine. After twenty-four hours' assisted ventilation his condition appeared satisfactory, but he suddenly died. Necropsy revealed gross emphysema, sticky exudate in the bronchi right down to the bronchioles, biventricular hypertrophy, and early pericarditis.

CASE 15: SPUTUM RETENTION WITHOUT CO_2 NARCOSIS

A man, aged 63, with chronic bronchitis, was admitted with acute purulent bronchitis. Chest signs were strikingly scanty but he was clearly gravely ill and unable to expectorate.

Treatment.—He was given intravenous aminophylline, hydrocortisone, strophanthin, and methicillin, and desoxyribonuclease.

Course.—His estimated arterial pCO_2 was 35 mm. Hg. Tracheotomy was performed for aspiration of secretions which were thick and tenacious. Oxygen at 2 litres per minute was administered via the tracheotomy tube, and therapy was continued with intramuscular methicillin, oral prednisone, digoxin, and chlorothiazide. His general condition rapidly improved; he was able to cough satisfactorily by the third day, and the tube was removed on the eighth day.

CASE 16: RAPID RECOVERY FROM CO_2 NARCOSIS WITH AUTOMATIC I.P.P.R.

A man, aged 62, a chronic bronchitic, was admitted with bronchopneumonia.

Treatment.—He was given tetracycline, aminophylline, and ephedrine, and oxygen.

Course.—After a few hours he became comatose and his estimated arterial pCO_2 was 60 mm. Hg. He was then given intravenous amiphenazole, strophanthin, methicillin, hydrocortisone, chloramphenicol, chlorothiazide, and aminophylline. As there was no improvement during the next hour, tracheotomy was performed. Tenacious secretions were aspirated and he was then ventilated automatically by an I.P.P. machine for three hours. At the end of this period his pCO_2 was 49, and no further artificial respiration was needed. Treatment was continued with bendrofluazide, prednisone, aminophylline, methicillin, chloramphenicol, and oxygen at 2 litres per minute via the tracheotomy tube. The tube was removed on the ninth day. His estimated arterial pCO_2 finally settled at 36 mm. Hg.

Discussion

Most emphysematous patients with acute respiratory infections can be adequately treated with various combinations of antibiotics, bronchodilators, respiratory stimulants, postural drainage, diuretics, digitalis, and oxygen. Administration of oxygen has been eased by the introduction of the Venturi mask (Campbell 1960), but even with 25% oxygen given in this way 1 of our patients (case 13) still developed hypercapnia and stupor.

The striking feature in each of our cases was the patient's inability to cough up his thick tenacious secretions. Postural drainage may be helpful, but such patients are usually too ill for it to be prosecuted vigorously with percussion. We are not impressed with the efficacy of detergent or proteolytic enzyme aerosols in thinning the sputum: indeed Palmer (1960) has presented evidence that humidification is equally effective. In any case, it is doubtful whether such aerosols penetrate the bronchial tree far enough to be of value. We have used intravenous desoxyribonuclease only once but feel it may be worth wider trial. Intravenous aminophylline has, in our hands, been the most effective bronchodilator, but did not appear to increase effective cough to any appreciable extent in these patients. Intravenous nikethamide in doses of up to 12 ml. has been of value in increasing the depth of respiration: in case 12, on two occasions, an infusion of 12 ml. nikethamide in 500 ml. saline daily for five days

enabled us to avoid assisted ventilation. We have not encountered untoward side-effects with this dosage. Intravenous amiphenazole was used in only 1 patient in this series. This produced some coughing with increased depth of respiration but did not obviate the need for tracheotomy, although in other cases not needing tracheotomy the drug appeared to be an effective respiratory stimulant.

CO_2 narcosis needing artificial ventilation was a feature in only 7 of our 16 cases. 4 of the 5 deaths in this series occurred in the group who were treated by automatic I.P.P.R. It is possible that I.P.P.R. contributed to their deaths. In each case death was sudden; necropsy was performed in 3 and revealed a picture of gross emphysema with obstructive bronchitis and bronchiolitis. Possibly, as Lee (1961) has suggested, severe air trapping had occurred, producing a persistent rise in intrathoracic pressure, thus causing a catastrophic fall in cardiac output and sudden death. Our experience with case 14 who was much better when manually ventilated but who died while on an I.P.P.R. machine suggests that cerebral anoxia may be a factor. With this machine the patient was being ventilated with approximately 25–30% oxygen; if there had been a serious degree of diffusion block this might not have been adequate, whereas manually we were ventilating him with 100% oxygen. This concept is perhaps supported by case 16, who required only a short period of I.P.P.R. but who, in view of our previous experience, was ventilated with approximately 50–55% oxygen. In our hands dichlorphenamide has not been effective in lowering pCO_2 (Harris 1961).

Once tracheotomy has been performed and secretions aspirated, the pCO_2 may fall and humidified 100% oxygen can usually safely be given at a rate of 2 litres per minute. A cuffed tube should be used as this ensures the reduction of dead space, enables I.P.P.R. to be performed, and facilitates pCO_2 estimation by the rebreathing method. Strict asepsis must be maintained and staff carefully drilled in aspiration technique. We have had only 1 patient (case 12) in whom secondary infection necessitated the reinsertion of the tracheotomy tube.

We feel that the fear that the patient may become dependent upon the tracheotomy is exaggerated. There has been no difficulty in "weaning" any patient from his tube; the technique employed is to block the tube for gradually increasing periods until the patient can manage all night with the tube closed.

We have used digitalis, despite its frequently disappointing results in cor pulmonale, for two reasons: firstly, for its direct stimulating action on the myocardium; and secondly, because of the difficulty in assessing whether or not there is superadded left ventricular failure in these patients. Diuretics have been used when there was evident right ventricular failure and also when there was any doubt about the left ventricle. In addition, we have administered steroids mainly as a general supportive measure.

Although this is impossible to prove, we felt at the time, and we feel now, that each of these patients was in danger of rapid death but for the tracheotomy. In future it will be our policy not to leave this procedure as a last resort, but to advise it at an earlier stage, even at the risk of performing a certain number of possibly unnecessary operations.

Conclusions

On the basis of our experience in the 16 cases presented and of many post-thoracotomy tracheotomies, not here reported, we suggest the following scheme for dealing with severely ill patients suffering from acute respiratory infections superimposed on chronic lung damage:

1. *Intensive antibiotic therapy*, starting with intravenous methicillin in order to cover the possibility of a resistant staphylococcus, plus chloramphenicol in order to obtain a wide antibacterial spectrum.

2. *Bronchodilators:* aminophylline, intravenously initially, followed by suppositories; isoprenaline aerosol if the relief of bronchial spasm is less urgent.

3. *Diuretics:* a benzothiodiazine and/or mersalyl for pulmonary or systemic congestion.

4. *Digoxin:* intravenously initially, followed by intramuscular or oral maintenance for its myocardial-stimulating action.

5. *Postural drainage:* to help expectoration.

6. *Steroids:* starting with intravenous hydrocortisone for general support.

7. *Respiratory stimulants:* nikethamide intravenously; amiphenazole intravenously, to try to increase ventilation chemically.

8. *Oxygen:* graduated administration of humidified oxygen, starting at 24%, to reduce the risk of CO_2 retention.

9. *Tracheotomy*, inserting a cuffed tube if no rapid response to above therapy, so that aspiration may be performed and ventilation improved.

10. *Assisted ventilation* if CO_2 narcosis is unrelieved by the above measures.

Summary

Tracheotomy was undertaken in 16 cases of acute respiratory infection associated with emphysema.

Of 7 patients who required assisted ventilation, 4 died; 1 other patient died from pulmonary tuberculosis and intractable cor pulmonale.

Tracheotomy alone may be life-saving, and it should be performed early rather than late.

We wish to thank our colleagues Mr. J. K. B. Waddington, Mr. I. M. Morrison, Dr. E. Taylor, and Dr. P. Marioni for their assistance in carrying out the tracheotomies; Dr. J. Thomas for help in cases requiring assisted ventilation; and Dr. D. Osborne Hughes, Dr. C. A. Hopkins, and Dr. G. A. Murray for referring to us cases admitted under their care.

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THE EFFECT OF A SEROTONIN ANTAGONIST (UML 491) IN CARCINOID DISEASE

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THE medical treatment of the carcinoid syndrome has been hitherto almost uniformly ineffective, though there are occasional reports of improvement with chlorpromazine (see reviews by Page 1958, Thorson 1958, and Sjoerdsma 1959). Drug therapy has usually been based on the assumption that most of the features of the syndrome result from the release of large quantities of serotonin into the blood. That this concept may represent an oversimplification is suggested by recent studies (Peart, Robertson, and Andrews 1959, Robertson, Peart and

Andrews 1962), which indicate that other substances besides serotonin may be formed in excess in carcinoid disease, accounting for some of the symptoms. Certainly drugs which antagonise serotonin have not been consistently beneficial.

Of the various possible functions suggested for serotonin in normal physiology, the mediation of intestinal motility seems best established (Bülbring and Lin 1958). It is therefore reasonable to consider whether the diarrhœa, which is so often a troublesome feature of the carcinoid syndrome, might respond to a suitable serotonin antagonist.

In this paper we report the effect, in three cases of the carcinoid syndrome, of 1-methyl-D-lysergic acid butanolamide tartrate (UML 491, ' Deseril ', Sandoz), a potent in-vitro serotonin antagonist (Doepfner and Cerletti 1958).

Case-histories

THE FIRST CASE

A woman of 59 was operated upon for intestinal obstruction in October, 1958. Laparotomy disclosed a primary carcinoid tumour of the ileum, with numerous secondary deposits in the liver. By November, 1959, she was experiencing severe exertional dyspnœa and asthmatic wheezing, with frequent facial flushes of varying severity. The 24-hour urinary output of 5-hydroxyindole acetic acid (5H.I.A.A.) varied between 99 and 306 mg. (normal upper limit 10 mg.). The level of free serotonin in venous plasma (Robertson and Andrews 1961) varied from 20 to 40 mμg. per ml. Facial flushes could be provoked by intravenous adrenaline and noradrenaline (Peart et al. 1959). She had had severe diarrhœa before operation; after resection of the ileal tumour the bowel actions returned to normal. In March, 1960, diarrhœa again developed, and she passed six or more watery motions daily. Chlorpromazine therapy was without effect. The administration of UML 491 2 mg. t.d.s. by mouth was followed by rapid improvement. The bowel actions were reduced to two or three daily, and the stools were formed. The other symptoms continued unchanged. When the UML 491 therapy was temporarily interrupted the diarrhœa returned, but it was once more brought under control when the drug was restarted (see figure).

The patient's general condition deteriorated steadily; in October the diarrhœa returned, and it was now not controllable by up to 16 mg. of UML 491 t.d.s. She died in November, 1960.

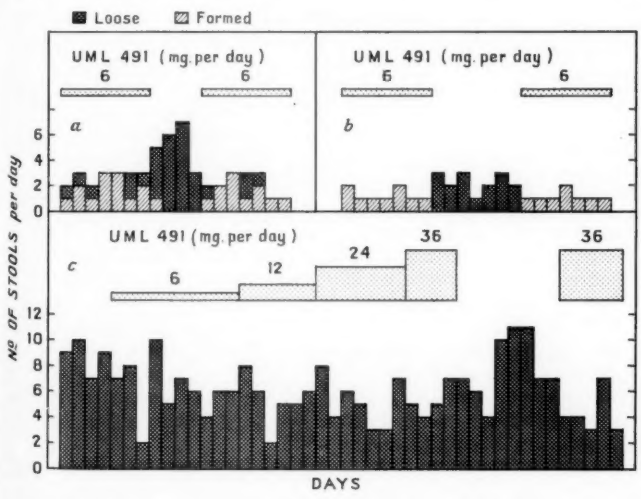
THE SECOND CASE

A 64-year-old man had had a productive cough since 1942. In 1957 he began to have facial flushing attacks and wheezing dyspnœa. The 24-hour urinary output of 5H.I.A.A. varied between 24 and 33 mg., and the free plasma-serotonin between 20 and 40 mμg. per ml. Facial flushes were provoked by both adrenaline and noradrenaline given intravenously. Various radiological investigations failed to reveal the site of the primary neoplasm, but the liver was enlarged clinically and it probably contained secondary deposits. Early in 1960 watery diarrhœa began, the patient passing up to four stools daily. When tablets of UML 491 2 mg. t.d.s. were given, the stools became formed and the bowel actions were reduced to one or two daily. When the drug was stopped diarrhœa returned, but it was controlled again when therapy was restarted (see figure). In March, 1961, taking 4 mg. of UML 491 t.d.s., the patient was having one normal bowel action daily.

THE THIRD CASE

In 1958 a woman of 49 began to have attacks of central abdominal pain. In November, 1959, she had occasional facial flushing, and in May, 1960, severe diarrhœa was added to the symptoms. On admission to hospital the following November she had clinical evidence of pulmonary stenosis and gross hepatic enlargement. The 24-hour urinary output of 5H.I.A.A. varied from 30 to 100 mg., and in the venous plasma the free-serotonin level lay between 60 and 100 mμg. per ml. Facial flushes were provoked by intravenous injections of adrenaline and noradrenaline.

The figure shows the effect of UML 491 on the frequency of bowel action. During the first 4 days in hospital no treatment was given, and an average of nine stools daily were passed. For the next 10 days, when UML 491 2 mg. t.d.s. was given, the number of bowel actions fell to an average of six. The average number of bowel actions remained at five while taking 4 mg. t.d.s., 8 mg. t.d.s., and even 12 mg. t.d.s. When the UML 491 was stopped for 8 days, the stools averaged eight per day, and the number fell again to four when the drug was restarted.



Effect of UML 491 on the number and character of the stools in (a) the first case, (b) the second case, and (c) the third case. (Each column represents one 24-hour period.)

Discussion

In these three patients the administration of UML 491 clearly alleviated the diarrhœa, though our study does not show how the drug acted.

The third case had experienced, in the 3 months before treatment was started, four or five severe cyanotic flushing attacks, one of which was seen to be associated with hypotension, extreme dyspnœa, diarrhœa, and coldness of the extremities. Flushing attacks of this kind are comparatively rare in the carcinoid syndrome. The more usual flush is a brighter red, hot, and accompanied by little or no blood-pressure change or dyspnœa (Robertson et al. 1962), and it has been suggested that these attacks depend upon the release of a substance or substances other than serotonin. Serotonin is released, however, in flushes which are accompanied by dyspnœa (Peart, Andrews, and Robertson 1961), and it may well be responsible for some or all of the particularly unpleasant features. Therefore the fact may be significant that, in the 6 months since large doses of UML 491 were given by mouth, the third patient has not experienced flushes of this severe cyanotic type.

With this one possible exception, UML 491 has been without noticeable effect on features of the carcinoid syndrome other than diarrhœa. Lanz (1960) has also reported a case of carcinoid disease in which UML 491 relieved the diarrhœa but had no effect

on the other features. Schneckloth et al. (1959) stated that little or no benefit was seen, but the effects, if any, on intestinal motility were not specifically mentioned.

Whether UML 491 might be effective in other conditions associated with diarrhœa remains to be seen.

Summary

A serotonin antagonist, 1-methyl-D-lysergic acid butanolamide tartrate (UML 491, ' Deseril ', Sandoz), was given by mouth to three patients with the carcinoid syndrome. In all three, when the drug was administered the diarrhœa was reduced.

No definite effect was produced on other features of the syndrome, with the possible exception of inhibition of severe flushing attacks in the third case.

No ill effects of the drug were found in these three patients.

The first case was referred to us by Dr. J. R. Ellis and the second case by Dr. J. G. Scadding, to both of whom we are indebted. We are grateful also to Dr. H. Holgate and Dr. R. A. Ellis, of Sandoz Ltd., for supplies of the drug.

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ADRENALINE AND STATUS ASTHMATICUS

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" The correct dose of a drug is that which produces the desired effect."—W. R. TROTTER.

MOST textbooks state that, in the exhibition of subcutaneous adrenaline hydrochloride (1/1000) for status asthmaticus, the so-called Hurst method—a minim (0·06 ml.) a minute—is the procedure of choice. With minor modifications, this standard version is given in thirteen British and ten American textbooks consulted:

Of these, two (Goodman and Gilman 1958, Beckman 1961) say that the slow and cautious intravenous injection of adrenaline (1/1000) may rarely be necessary, and only one (Sollmann 1957) states a preference for intramuscular injection. In the twenty-three textbooks, specific statements of the maximum permitted dosage are: 6·0 ml. (Craddock 1958); 3·0 ml. (Warner 1960); 4·0 ml. (Brooks 1961); and 5·0 ml. (Pearson 1959). Three authors, other than the above, offer: " up to 8·0 ml." (Grant 1960); " adrenaline in full doses " (Tidy 1954); and " as much as 7·0 ml. may be needed " (Birch 1960).

All agree that adrenaline is the drug of choice in severe acute bronchial asthma, and most emphasise the need for prompt administration.

My previous experience (Broom 1960a and b) has suggested that a vigorous therapeutic approach is sometimes necessary in status asthmaticus, and that prompt administration of large doses of adrenaline might speedily avert a difficult situation. This report is concerned with the domiciliary management of twenty-four cases of severe acute bronchial asthma seen in general practice, with particular reference to adrenaline therapy. Fifteen of these cases qualified as status asthmaticus, being of clinical grade 4 (" wheezing respiration, accessory muscles in use, discomfort intermediate between grades 3 and 5 ") or grade 5 (" severe distress, able to talk only in gasps "), according to the Medical Research Council's classification (1956).

Clinical Experiences

The details of the cases of asthma treated with adrenaline are shown in the table. The technique was similar in all cases. Adrenaline 1/1000 was given by deep intramuscular injection into the quadriceps femoris; the injection took from 5 to 15 minutes, and the plunger of the syringe was withdrawn a little every minute to ensure that adrenaline was not entering a vein. The intramuscular route was chosen to promote absorption.

An attack was considered to have been relieved when all " wheeze " had disappeared on auscultation of the chest; this was checked again half an hour later. In nineteen of the twenty-four cases relief was obtained within about 30 minutes after the adrenaline had been given. In all cases there was some response to a dose of 2–5 ml., and the rapidity of the response served as a guide to the total dose. In cases 9, 12, and 21 a second injection was necessary (see table). Cases 17 and 21 both had to be admitted to hospital after 10 and 8 ml. of adrenaline respectively had failed to produce any improvement.

Side-effects were seen in all but six cases, and they were often unpleasant; tachycardia (eighteen cases); vomiting (sixteen cases); pallor, headache, and sweating (ten cases); extrasystoles (five cases); and tremors and anxiety (two cases). But these symptoms, together with the considerable pain of the injection, were willingly borne in the hope of quick and complete relief.

After the acute attack was relieved the patients were given promethazine by mouth for the next 24 hours, and penicillin by mouth for the next 5 days, except for case 7, in which the antibiotic used was tetracycline.

Discussion

The published accounts of adrenaline overdosage show that death follows the inadvertent injection of massive doses at fast rates (Gormsen 1939, Freedman 1955); this has usually arisen because of errors in the concentration of the solution. Instances of survival after large doses of adrenaline must be seriously queried as being due to lack of potency of the solution, which may deteriorate after some months (Argent and Dinnick 1954).

Reports vary as to the maximum tolerable dose and the minimum lethal dose of adrenaline 1/1000. Gormsen (1939) reviewed twenty-eight deaths from hypodermic injection of adrenaline, and found that the smallest fatal dose was about 10 mg. (10 ml. of a 1/1000 solution). Freedman (1955), in describing eleven fatal cases of accidental adrenaline overdosage, concluded that the minimum lethal dose was about 4 mg. and the maximum tolerable dose was 7–8 mg.; and he emphasised that the lethal intravenous dose " is very much smaller than the subcutaneous one."

Steroid therapy has been said to have a beneficial effect on status asthmaticus, tending to reduce both the severity and the length of the attack (Medical Research Council 1956).

A direct comparison between the effects of adrenaline and prednisolone in the acute attack of asthma (Pinkerton and Van Metre 1958) has shown striking differences:

Thirteen patients were given intramuscular injections of adrenaline (1/1000) 0·5 ml., and thirteen received a single intravenous dose of prednisolone 33·5 mg. The "median vital capacity" of each group before treatment was 0·8 litre. In the prednisolone group this capacity had increased to 0·9 litre 30 minutes after injection, and 3 hours later it was 1·05 litres. In the adrenaline group, the capacity was 1·25 litres 5 minutes after injection, and after 30 minutes it was 1·6 litres.

This suggests that in status asthmaticus adrenaline 1/1000 given by the intramuscular route might be more effective than intramuscular steroids.

My experience with this series seems to point to a need for a reorientation of adrenaline dosage in bronchial asthma, with a view to more rapid and complete relief of the severe attack. But I would emphasise that, when injecting adrenaline by the intramuscular route, the rate should be comparatively slow, about 2–5 ml. in 5–15 minutes; and at minute intervals one must make sure that the syringe is not in a vein. The quadriceps femoris is the best site for injection because this is the largest available muscle mass devoid of large blood-vessels, and the most convenient to keep still.

Summary

Liberal amounts of adrenaline 1/1000 have been injected intramuscularly in fifteen cases (aged 6–76) of status asthmaticus, and in nine less severe asthmatic attacks.

In nineteen cases the injection of 2–5 ml. of adrenaline over 5–15 minutes gave complete and lasting relief within about 30 minutes. Three patients needed further intramuscular adrenaline, and two had to be admitted to hospital.

The unpleasant side-effects (which occurred in eighteen

DETAILS OF THE CASES TREATED

Case	Sex and age (yr.)		History	The present attack of asthma		
				Duration (hr.)	Grade*	Dose of adrenaline (intramuscular)
1	F	76	Attacks of asthma since pneumonia 4 years previously ..	4	5	3 ml.
2	M	55	Many years bronchitis and emphysema; retired because of ill health; a bedridden respiratory cripple; many previous episodes of asthma	8	5	4 ml.
3	F	42	Asthma since childhood	3	4	4 ml.
4	M	68	Bronchitis and emphysema since "gassed" in 1st world war; recurrent attacks of asthma	2	5	5 ml.
5	F	73	Bronchitis for many years; 1st attack of asthma	1	4	3 ml.
6	M	32	Bronchitis for 6 years; occasional asthma	4	3	4 ml.
7	M	58	Bronchitis often treated in hospital; several asthmatic attacks requiring adrenaline over past 6 years	2	4	5 ml.
8	F	34	Severe asthma for 4 years	3	5	4 ml.
9	F	14	Eczema and severe asthma; many admissions to hospital; several asthmatic attacks needing adrenaline	24	5	0·5 ml. failed to give relief; 3 ml. more given 3 hours later was successful
10	F	6	Eczema and mild asthma	13	3	2 ml.
11	F	70	Bedridden with severe osteoarthritis (weight about 16 st.); bronchitis for 4 years; asthma for 1 year	72	3	4 ml.
12	F	35	Post-hysterectomy vaginovesical fistula; asthma for 1 year, requiring three hospital admissions and 6 previous adrenaline injections	20	4	4 ml. failed to give relief; 40 min. later a further 4 ml. was successful
13	F	19	Bronchitis before tonsillectomy at 7 years; none since until 5 days before this first attack of asthma	24	3	3 ml.
14	F	6	Severe asthma and eczema; three times in hospital with pneumonia, and once with asthma; 1 previous adrenaline injection	9	4	2 ml.
15	F	18	Severe asthma; twelve admissions to hospital; 3 previous adrenaline injections	30	3	3 ml.
16	F	11	Moderately severe asthma; once in hospital; 12 previous adrenaline injections; eczema	6	3	4 ml.
17	M	56	6 years' chronic bronchitis; 2 weeks' bronchitis (untreated); one previous admission to hospital with asthma	24	4	10 ml. failed (admitted to hospital)
18	M	19	Mild asthma; once in hospital	36	3	5 ml.
19	F	7	Mild asthma; once in hospital	1	4	4 ml.
20	M	27	2 years' mild asthma	1	3	5 ml.
21	F	64	Bronchitis for 20 years; occasional mild asthma; no previous admission to hospital, or adrenaline injections; 2 weeks' bronchitis (untreated)	24	4	8 ml. failed (admitted to hospital)
22	M	20	Bronchitis and asthma for 3 years; 2 weeks' bronchitis (treated)	4	3	2 ml. failed to give relief; a further 2 ml. 30 min. later was successful
23	M	22	Mild lifelong asthma	23	4	5 ml.
24	M	9	Lifelong asthma; once in hospital; 3 previous adrenaline injections	5	5	3 ml.

*According to the Medical Research Council (1956).

cases) were willingly exchanged for prompt relief from dyspnœa. Care was taken to avoid intravenous injection.

This method seems worthy of further trial in severe acute bronchial asthma.

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ANÆSTHESIA FOR EMERGENCY EXCISION OF THORACIC ANEURYSM WITH RESPIRATORY OBSTRUCTION

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ONE of us (D. A. W.) was asked to give an anæsthetic for thoracic aortography, in a woman of 60 with a syphilitic aortic aneurysm. She had had pain in the thoracic spine for 10 years, and a shadow had been demonstrated by mass miniature radiography 8 years before; for 2 years her voice had been high pitched and for 18 months she had had dysphagia and some wheezing. At the pre-anæsthetic examination she was not short of breath when walking and not using accessory muscles of respiration, but stridor was readily audible even at rest. There were no other signs of respiratory obstruction, and the neck veins were not engorged. She said that if she walked fast she had a sensation "as if something was closing in her chest". (This subsequently seemed a very accurate description). Examination of chest X-rays suggested considerable obstruction at the carina: the left main bronchus was not seen, and the right main bronchus seemed to be narrowed (fig. 1).

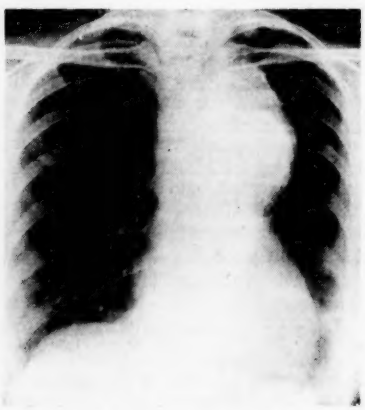

Fig. 1—Straight postero-anterior radiograph showing enlargement of the mediastinal shadow caused by the aneurysm.

Case-record

Obstruction of Airway

At 1.30 P.M. the patient arrived in the X-ray department, having been given pethidine 100 mg. and scopolamine gr. $^1/_{150}$ (0·43 mg.) an hour before. She was comfortable and not dyspnœic; but because of the stridor and the appearance of the chest X-rays it was thought unwise to abolish spontaneous respiration. 4 ml. of 4% lignocaine solution was injected through the cricothyroid membrane and 500 mg. of thiopentone was given slowly intravenously. Partial respiratory obstruction occurred when consciousness was lost. Laryngoscopy was then easily performed, and beyond the larynx a whitish ulcerated area could be seen on the posterior tracheal wall. The trachea was sprayed with 10% cocaine in the hope that this would shrink the mucosa and increase the airway. The larynx was intubated easily with a no. 9 armoured tube, but the tube was held up in the trachea and would not pass the obstruction. A no. 8 Magill rubber tube was then passed, and this was held up near the carina. With the tube held in firmly and the head slightly extended, adequate ventilation was obtained. Anæsthesia was maintained with 4 litres of nitrous oxide and 3 litres of oxygen per minute using a Magill attachment, and the patient's colour was satisfactory. Introduction of the arterial catheter into the aneurysm proved difficult, and the anæsthetic lasted $2^1/_2$ hours.

At 4 P.M. the endotracheal tube was withdrawn after aspiration through it with a suction catheter. The breathing became completely obstructed. As the patient's condition was deteriorating rapidly, an adolescent bronchoscope was gently forced, with some trepidation, past the ulcerated and bulging posterior tracheal wall where the obstruction began. It was then passed into the right main bronchus to the level of the right upper-lobe orifice, and an airway was established. At this stage it was impossible to enter the left main bronchus because of the distortion at the carina. There was a considerable amount of mucus beyond the narrowed portion which had not been aspirated through the endotracheal tube, and it was felt that this had added to the obstruction when the patient was extubated. With the bronchoscope in place, the patient's condition was fairly satisfactory, although only the right lung was expanding properly.

At 4.30 P.M. the patient was taken in her bed from the X-ray department to the theatre recovery ward. The bronchoscope was held in place to ensure her airway during this move, which was along a corridor and up in a lift.

Towards 5 P.M. the bronchoscope was removed. Although her breathing was laboured she maintained a good colour. She was semiconscious, and had bouts of restlessness with inspiratory stridor and a prolonged expiratory wheeze similar to that heard in an attack of bronchial asthma.

At 6 P.M. her condition had not changed. It was hopefully thought that the obstruction might become no worse than it had been before the angiography.

By 7 P.M., as her nailbeds were becoming cyanosed though warm, oxygen was given by nasal catheter. The added oxygen improved her colour, but she gradually showed signs of carbon-dioxide retention. Her blood-pressure rose to 180/80 mm. Hg (normal 170/90). She had a warm skin with full veins and was more restless. The bronchoscope was passed again. We hoped that the increase in the respiratory obstruction during the last 2 hours was due to aspiratable material, but unfortunately it was not. Very little material could be aspirated, and the narrowing at the carina appeared to have increased.

At 8.45 P.M., as the patient started struggling violently, the bronchoscope had to be removed for fear of rupturing the aneurysm, and respiratory obstruction became complete. The bronchoscope had to be reintroduced as soon as help could be obtained to hold the patient still. An adequate airway could be maintained through the bronchoscope, which the patient tolerated with reassurance.

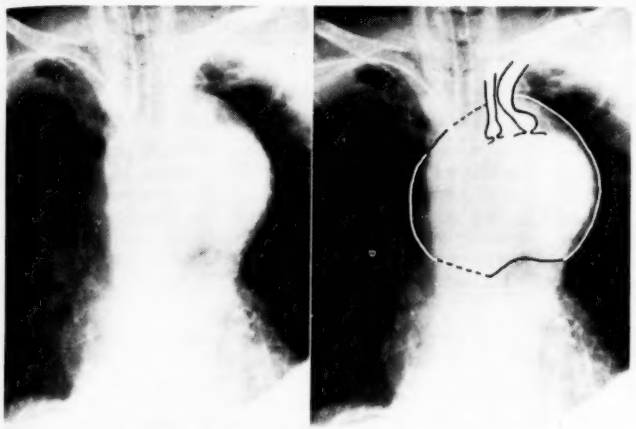

Fig. 2—Angiocardiogram. In the right-hand figure the left common-carotid and subclavian arteries have been outlined.

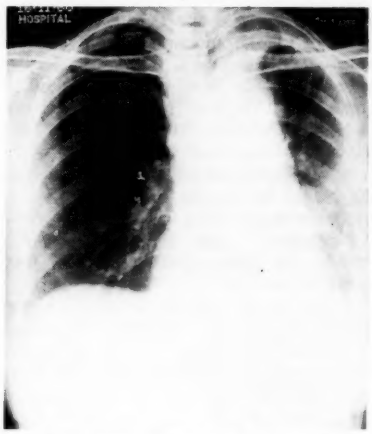

Fig. 4—Postoperative postero-anterior radiograph of chest.

Resection of Aneurysm under Hypothermia

At 9 P.M. Mr. Geoffrey Flavell saw the patient and decided to resect the aneurysm as soon as possible so as to relieve the respiratory obstruction. Hypothermia was considered necessary not only to protect the spinal cord and kidneys during aortic occlusion but also because the left subclavian and left common-carotid arteries showed narrowing at their origins and might need to be occluded during the resection of the aneurysm (figs. 2 and 2A).

At 9.25 P.M. 50 mg. of chlorpromazine was given very slowly intravenously. The patient was moved into the operating theatre with the bronchoscope still in position, and anæsthesia was induced with nitrous oxide and oxygen (5 litres per minute of each) and ether added gradually using a Magill attachment ending in a no. 8 (32 F.C.G.) endotracheal tube plugged into the bronchoscope.

At 10 P.M. hypothermia was started by placing the patient on a cooling mattress and surrounding her with icebags.

As the cooling progressed her colour improved and spontaneous respiration became less laboured. A circle carbon-dioxide absorber was substituted for the Magill attachment and respiration was first assisted and then taken over by manual compression of the reservoir bag. The blood-pressure, as measured by sphygmomanometer cuff, fell steadily to 60 mm. Hg. systolic at 11 P.M. by which time the œsophageal temperature had fallen to 33°C.

By 11.20 P.M. the œsophageal temperature was 32°C; active cooling was stopped and the ether discontinued. The patient was turned on to her side for a left thoracotomy. By this time no pulse could be felt at the wrist. Her colour was pink and there was a brisk skin capillary refill after pressure blanching.

By 11.40 P.M. a lateral thoracotomy had been made through the bed of the resected 5th rib. A large aneurysm of the descending aorta was present, commencing just below the origin of the left subclavian artery. The wall was thickly calcified, eroding the vertebræ and pressing on the carina, both stem bronchi, and the œsophagus.

By 12.28 A.M. the œsophageal temperature was 30°C and clamps had been applied to the aorta above and below the aneurysm. Once these clamps had been applied a very adequate superficial temporal pulse could be felt though no radial pulse could be palpated in the left arm. At this point spontaneous respirations returned; so 15 mg. of *d*-tubocurarine chloride had to be given at 12.35 A.M. to provide controlled respiration again. The aneurysm was excised and a crimped 'Teflon' graft was sutured to the cut ends of the aorta. The graft was filled with citrated blood and the clamps were removed at 12.57 A.M. (29 minutes' occlusion). By 1.30 A.M. the chest had been closed with an underwater drain. At this time the œsophageal temperature had fallen to 28·5C° because cold citrated blood had been transfused rather rapidly to replace a sudden blood loss and to combat the fall in pressure from the release of the aortic clamps.

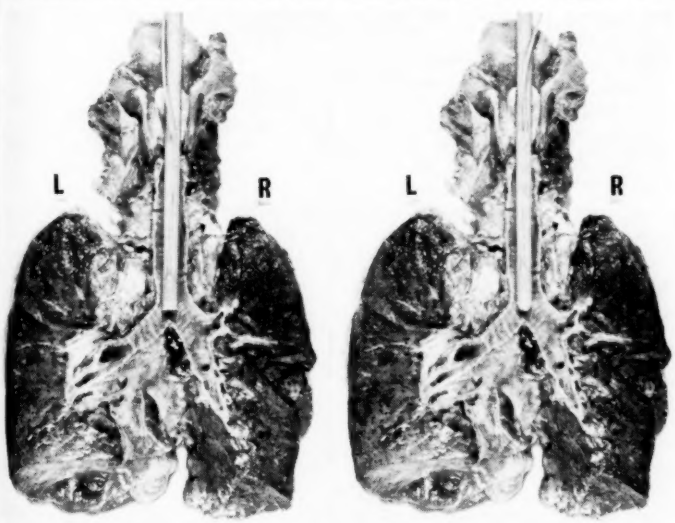

Fig. 3—Left: the Machray tube, with bevel cut, is shown lying in position on a dissected specimen. (For clarity it is shown as an endotracheal instead of a tracheostomy tube.) Right: theoretically preferable modification of the bevel of the Machray tube.

Further Course

By 2.30 A.M. the temperature had risen to 32°C and spontaneous respiration had returned which appeared adequate. When we looked down the bronchoscope, which was still in situ, we noted that the patient had a good airway during quiet respiration through both main bronchi. Just above the carina the posterior wall of the trachea readily collapsed on removal of the bronchoscope, and coughing on suction or deep respiration easily made this a complete collapse of the airway; it was obvious that she would need some support to the trachea in the postoperative phase.

The bronchoscope was reintroduced to maintain the airway and allow us time to construct a tracheal splint. It was felt

that a tracheostomy would permit aspiration of the airways; so, after accurate measurement from the carina to the second ring of the trachea, a no. 8 Machray short-cuffered endobronchial tube was cut down and the bevel modified (fig. 3). This was introduced through a tracheostomy, the bronchoscope was removed, and anæsthesia was discontinued.

The œsophageal temperature rose steadily to 35°C, when she began to react to stimuli. She was transferred to the recovery ward where morphine gr. 1/6 (10 mg.) was given to ensure a quiet emergence. Her blood-pressure was 90/60, her colour pink, and her level of consciousness satisfactory.

Next day she was conscious and had little memory of the events after going to the X-ray department. Blood-pressure, pulse, and respirations were satisfactory. 2 days after operation the tracheostomy tube had to be withdrawn a little because the tip was tending to enter the right main bronchus, and 4 days after operation it was removed. A good airway was maintained, and, although her voice was a little more husky than usual, it soon returned to normal. In the second week after operation she was transferred back to the care of Lord Evans at the Royal Masonic Hospital, where she made satisfactory progress (fig. 4).

Discussion

The use of an endotracheal tube for the aortography might be criticised since it might have been possible to manage the anæsthetic with a facepiece, using halothane and an oxygen-helium mixture. However, it is just as likely that the anæsthetic and aortography might have disturbed the circulatory dynamics and hence the tension in the aneurysm. Complete respiratory obstruction might have developed when the procedure was being undertaken, and this would have been more difficult to deal with.

In retrospect, we think it would have been preferable to introduce the bronchoscope from the moment anæsthesia was induced and thus have an adequate airway past the obstruction during aortography. Introducing the bronchoscope in these circumstances is rather similar to passing an œsophagoscope, because the collapsed tube opens up in front of the instrument. The opening up of the trachea could have been done under direct vision rather than by blindly forcing a tube past the bulging aneurysm and running a greater risk of rupture. In this patient so much damage had been done to the trachea by pressure of the aneurysm that a splint had to be made to prevent it collapsing in the postoperative phase. A better shape for this splint might have been as shown in fig. 3A; for it would then have supported the carina and at the same time have given an adequate airway to both main bronchi.

Another feature noted was the improved airway as the blood-pressure fell in the aneurysm under hypothermia. Both lungs could be inflated easily when the chest was opened.

Summary

In a woman of 60 with an aortic aneurysm, aortography was followed by complete respiratory obstruction. This was relieved by excision of the aneurysm under hypothermia, but a tracheal splint was afterwards required for several days to prevent collapse of the weakened posterior wall of the trachea.

Our thanks are due to Lord Evans, Dr. N. D. Compston, and Mr. Geoffrey Flavell for permission to publish this case, and to Prof. I. Doniach and Dr. P. G. I. Stovin for their help in the preparation of the anatomical specimen.

New Inventions

AN AUTOMATIC FINGER BLOOD-PRESSURE RECORDER

In recent years, there has been an increasing amount of research into the causes of high blood-pressure in man and the use of powerful hypotensive drugs. As a result an instrument is now needed that will measure the blood-pressure automatically and frequently over many hours. In this paper we describe a sphygmomanometer that records the systolic pressure in the finger at regular intervals for 12 hours.

BASIC PRINCIPLES

The recorder consists of a pump which raises the air pressure in two thin rubber cuffs fitting closely round a finger. The pressure in the distal or sensing cuff is kept at about 20 mm. Hg lower than that of the proximal or occluding cuff. As the pressure in the occluding cuff falls below that of the systolic arterial pulsation the pulses are picked up by the sensing cuff; these are recorded as pressure pulses fed by a flexible polyethylene tube to a photoelectric transducer. The output from this is amplified and applied to a relay, which pulls a hot-wire recording pen on to a heat-sensitive paper chart that revolves once in 12 hours.

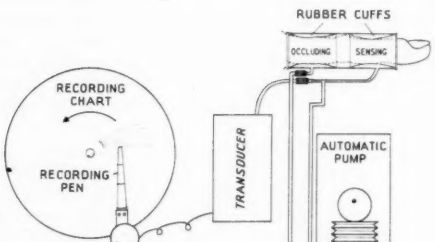

Fig. 1—Schematic diagram of principles of automatic finger sphygmomanometer.

The recording pen is also actuated in a radial direction by a pressure bellows; hence it takes up a position whose distance from the centre of the circular chart is proportional to the pressure in the proximal cuff (fig. 1).

The Transducer System

The pressure pulses from the distal cuff are fed into the optical transducer. A double 'Perspex' chamber is used, separated by a rubber diaphragm with a controlled leak between the two chambers; the sensing cuff is connected to one of the chambers. This arrangement allows the pressure in the two chambers to equalise, if it should change slowly; but more rapid changes, in the range of the pulse frequency, will move the diaphragm. A small mirror, mounted on one side of the diaphragm, becomes tilted by a slight difference of pressure between the two chambers. A beam of light is focused on the

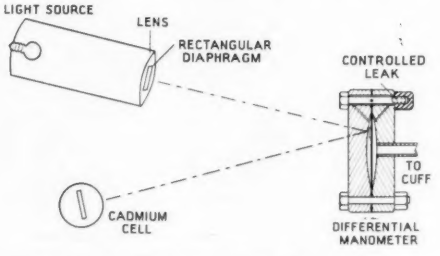

Fig. 2—The photoelectric optical transducer.

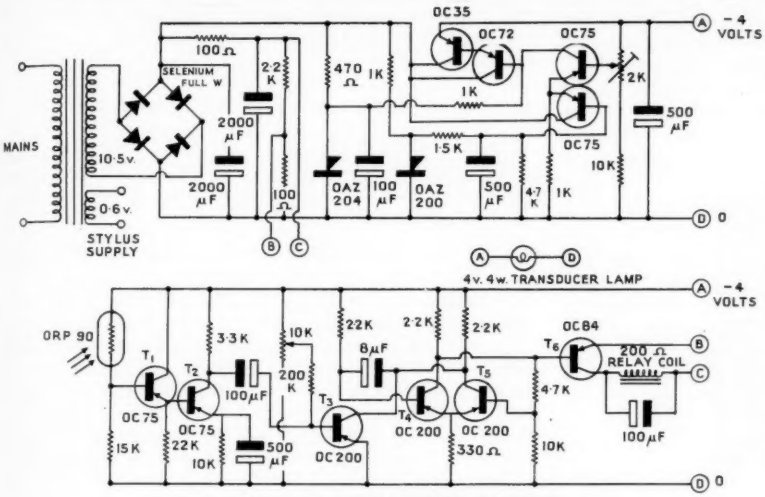

Fig. 3—Circuit diagram of amplifier and trigger.

mirror, which reflects it to illuminate part of a cadmium-sulphide photoconductive cell (fig. 2).

The cell is connected through a load resistor to a 4-volt supply, and voltage pulses are developed across the load. These are amplified by a 3-stage transistor amplifier (fig. 3), comprising T_1, T_2, and T_3, which has capacitance interstage coupling. The amplified pulses (if they exceed a threshold level which may be set by varying the base current of the last stage of the amplifier) trigger the monostable circuit formed by transistors T_4 and T_5. The amplitude and duration of the pulse produced by this circuit will be determined only by the circuit constants. The pulses produced at the collector of transistor T_4 are supplied to the base of a medium-power transistor T_6, and they energise the coil which actuates the pen mechanism, causing a hot stylus to print dots on the heat-sensitive chart.

The 4-watt tungsten-filament lamp in the transducer, and all the transistor circuits (except the output transistor), are supplied from a 4-volt stabilised supply of conventional design. A ripple of less than 1 mV is obtained on the supply voltage with the full load current of 1 amp., and we have found this to be satisfactory. The output transistor and coil are supplied from the unstabilised side of the power supply. A capacitance is connected across the coil to prevent excessive transient voltage during switching.

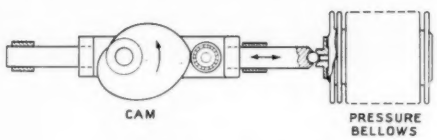

Fig. 4—The pump mechanism.

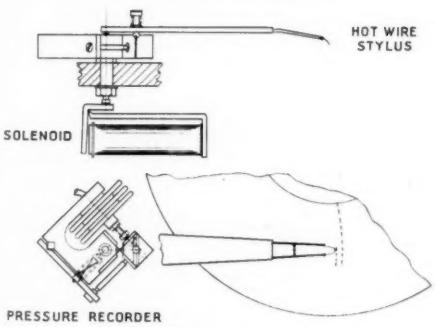

Fig. 5—The recording pen.

The Pump Unit

Air for inflation of the cuffs is provided by a motor-driven pump, which when required can be started by closing a pair of contacts on the electric chart motor. It consists of a flexible metal bellows compressed by a cam-operated plunger, whose initial movement closes a small port in the end of the bellows which is normally open to the atmosphere (fig. 4). The shape of the cam provides for a linear fall in pressure occupying two-thirds of the 1½-minute cycle. Air passes into the system from the bellows via a constriction formed by a needle valve, the only purpose of which is to prevent loss of the pressure signal from the cuff into the large volume of the bellows.

The compressure air flows freely into the sensing cuff and into the manometer of the transducer. It has to pass a further constriction to reach the compressing cuff and the recorder pen. This second constriction is so adjusted that, during the rise in pressure, the compressing cuff is filled more slowly than the sensing cuff. During the fall in pressure the effect is reversed, with the result that the compressing cuff remains at a slightly higher pressure (20 mm. Hg) than the sensing cuff. The recorder pen, by virtue of its direct connection with the compressing cuff, shows at any moment the pressure within that cuff.

Fig. 6—Photograph of the complete recorder.

The cam spindle of the pump also carries a switch which interrupts the signal from transducer to recorder during the rise in pressure, so eliminating adventitious signals from the record.

The Recorder Unit

This consists of a Horstmann motor driving an 8-in. circular 12-hour chart. The record is made radially by a hot-wire stylus (carried by a solenoid-operated arm hinged on crossed tapes), which is swept across the chart by a small bellows (fig. 5). The finger cuffs are made of thin rubber tubing folded back on itself over a brass tube and secured by elastic bands. The cuffs are connected to the pump by soft polyethylene tubing. Records are made of the systolic pressures only at intervals of either 1½ or 5 minutes.

Fig. 6 shows the unit assembled in its case, with the cuff on the patient's finger, fig. 7 is an example of a 12-hour record of a normal person's blood-pressure taken with the recorder.

DISCUSSION

We decided to use the finger rather than the arm to record the pressures because of the discomfort from constricting pressure on the arm, and the disturbance of sleep that it might cause. The disadvantage of using the finger is that the diastolic

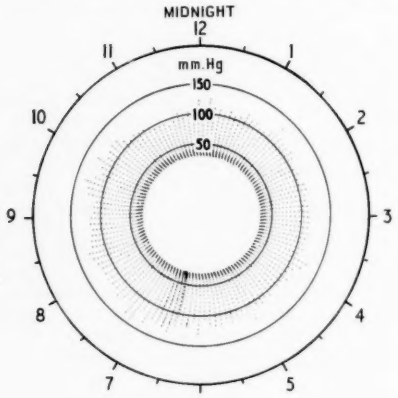

Fig. 7—12-hour record of a normal person's blood-pressure.
The first dot towards the periphery represents the systolic blood-pressure in the finger.

pressure is apparently not measurable by this method; however, the finger cuff is comfortable even under a compression of 300 mm. Hg, and we therefore decided to sacrifice the diastolic pressure readings.

The instrument is capable of recording the systolic pressure only in the finger arteries. Its accuracy depends on the sweep-rate of the pen and the pulse-rate of the patient; the faster the rate the more accurate the reading. On any single reading with a pulse-rate of 60 and a sweep-rate of 50 mm. in 5 sec., the accuracy would be to ± 10 mm. Hg. Taken over a series of readings, the average becomes much more accurate on a statistical basis.

Spurious interference from movement of the finger or the line between the cuff and the recorder causes unwanted recording; but usually, on inspection, one can isolate these random dots from the regular dots produced by the patient's regular pulse. The cuff itself is comfortable to wear, and the pressure on the finger does not disturb the patient's sleep. It is of course necessary to keep the finger at a specified height in relation to the heart; in practice we usually put the hand in a sling with the cuff at the height of the left ventricle.

The recorder is standardised by means of an ordinary mercury manometer placed parallel with the recording pen, the pen then being operated by a switch at known heights of the mercury column. In this way the pressures are accurately graduated on the paper. In practice one may have to fix the cuff to the finger with adhesive tape. It is desirable to keep the finger warm because below a certain temperature vasoconstriction will prevent the machine from writing the pressure. This has not caused serious trouble in the majority of patients, but sometimes it has been necessary to warm the hand in hot water. A small heating coil might be introduced into the cuff for this purpose.

SUMMARY

An instrument has been designed to record the blood-pressure automatically at frequent intervals over 12 hours. It consists of a pump which raises the air pressure in two thin rubber cuffs that fit closely round a finger; the proximal cuff is used for occluding the artery, and the distal one for sensing the pulsation. The signals from the distal cuff are fed through a transducer and amplifier system, and they actuate a pen on a revolving chart.

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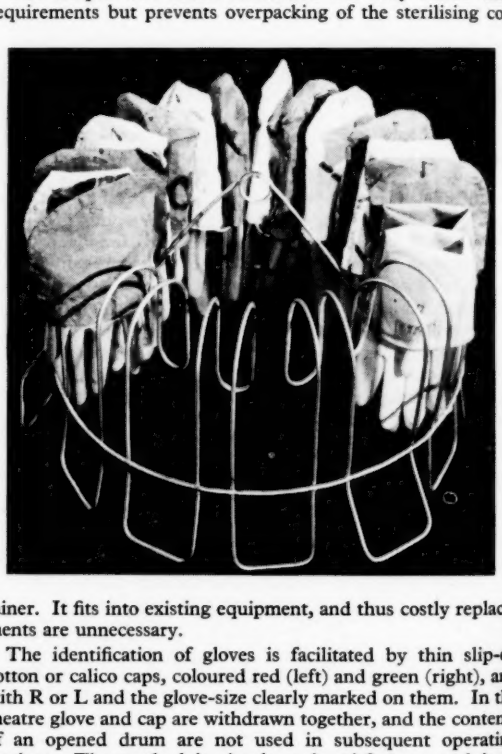
A FRAME FOR STERILISING RUBBER GLOVES

NUMEROUS reports in recent years, and publications by the Nuffield Provincial Hospitals Trust and the Medical Research Council have reaffirmed the inefficiency of sterilising in many hospitals. Materials impermeable to steam present special difficulties. Experiments at this hospital on rubber gloves, packed in standard glove boxes in the generally accepted way, in thin calico or cotton packets, have confirmed that heat penetration is inadequate. These experiments have made it clear that the only satisfactory way of exposing the entire surface of the gloves to the sterilising action of steam is to open them out somehow.

The simple wire frame illustrated not only fulfils these requirements but prevents overpacking of the sterilising con-



tainer. It fits into existing equipment, and thus costly replacements are unnecessary.

The identification of gloves is facilitated by thin slip-on cotton or calico caps, coloured red (left) and green (right), and with R or L and the glove-size clearly marked on them. In the theatre glove and cap are withdrawn together, and the contents of an opened drum are not used in subsequent operating sessions. The method is simple and satisfactory, and is in general use in this hospital.

In loading it is important to prevent air locks; hence care must be taken that the gloves hang freely without kinking. Though the frame has been designed for drums, it could be adapted for rectangular boxes containing one or more pairs of gloves.

The frame can be obtained from H. Hawkins and Sons, 7, Hawkesworth Road, Bromley, Kent.

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Preliminary Communication

LEVITATION

IT occurred to me that supporting a patient on air might solve some of the problems of nursing patients whose illness necessitates the avoidance of contact with their beds—e.g., patients with severe burns of the trunk or patients with spinal paraplegia.

At first it seemed that a patient could be supported on air by using ducted air from a centrifugal blower passing through a porous membrane approximately the size of the average adult trunk. In other words it seemed that the most fruitful approach was to use air at high pressure and low volume. In the early stages it was calculated from estimations of the weight and area of the average adult trunk that a pressure of $1{\cdot}4 \pm 0{\cdot}4$ lb. per sq. in. of air would be required to support the trunk of a patient. Using these figures for the high-pressure, low-volume method of supporting the trunk on air, it was found that as soon as the subject was lifted from the "bed" the air pressure fell so much that the subject fell back on the "bed"—a most disconcerting experience, particularly as this ascent and descent occurred at a very high frequency.

At this stage it was thought that it would be wise to look more closely at the principle of operation of the Hovercraft. In brief, this principle is that a heavy body can be kept aloft on a cushion of air which is prevented from leaking out through the edges by means of a curtain of air. Both the curtain of air and the supporting cushion of air can be provided by a low-pressure, high-volume fan system. As the result of discussions with some members of the Hovercraft research team of the National Research Development Corporation, it was decided that this low-pressure, high-volume system was likely to be a better way of supporting patients.

This principle has been applied by means of the apparatus illustrated in fig. 1. Both the curtain and the cushion of air are provided by means of suitably arranged jets positioned in a rectangular form. In the apparatus illustrated, which has been designed to "levitate" domestic pigs whose total weight is equivalent to the trunk weight of the average adult, 12 jets, 6 in. wide by $^1/_2$ in. deep, are employed. Approximately 2000 c.ft. of air per minute are supplied by means of a paddle fan at a pressure of 18 in. water.

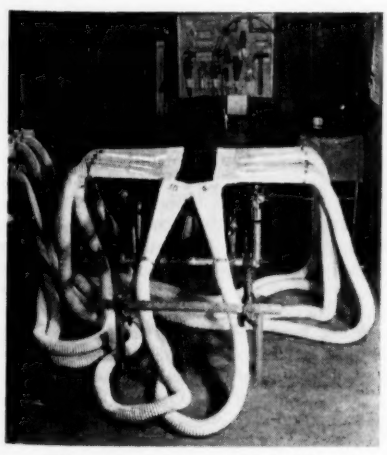

Fig. 1—Arrangement of apparatus.

It was found that by using this apparatus "pigs can fly" (fig. 2). In all experiments there are inevitable problems, and so far we have studied only some of the more obvious ones. The problems which immediately come to mind are (*a*) the possible damage to tissues produced by the air pressure, and (*b*) the possible extreme and rapid cooling by the high air-flow rates.

To study the problem of tissue damage, a 2 in. × 2 in. dermal wound was made on the back of an anæsthetised pig in such a position that it was exposed to the jet pressure of unsterilised air. The piece of skin removed from the pig was left exposed to normal laboratory air conditions, and in a certain sense served as a control. The pig was then "levitated" until the dermal wound was dry—a period of one hour. After this time the excised piece of skin was wet and showed no signs of coagulation (fig. 3). My colleague, G. D. Winter, who is studying the problem of normal wound healing in the domestic pig, has found that a comparable wound in normal conditions dries in approximately 24 hours.

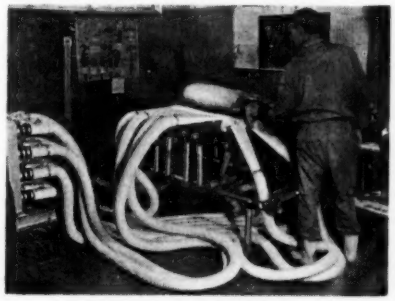

Fig. 2—Pig "floating".

(A) (B)

Fig. 3—A, Appearance of wound one hour after "levitation"; and B, removed tissue placed beside wound for comparison.

In the days following this "levitation" the pig showed no observable difference from its normal state; the wound was not clinically infected and was healing normally.

As far as the cooling of the pig was concerned, the rectal temperature was recorded at a depth of 5 in. from the anus and during the hour of exposure it fell by 7°F. This fall in body temperature was thought to be a factor contributing to the postoperative wellbeing of the animal.

From the experiments conducted so far, it seems that low-pressure, high-volume "levitation" may offer the following advantages in treatment: (*a*) reduction in shock, (*b*) prevention of tissue-fluid loss, (*c*) rapid creation of a dry antibacterial shield, and (*d*) a possibility of avoiding bedsores.

My thanks are due to the R.A.M.C., who have generously provided staff and equipment; and to Mr. H. J. Seddon and the Institute of Orthopædics for having encouraged this work. I must also acknowledge the cooperation and advice of the following companies: Abrey and Gerratt, Avica Equipment, Benham and Sons, Keith Blackman, Brook Motors, Burgess Products, Flexible Ducting, Horace Green, W. C. Holmes, the North Thames Gas Board, Porous Plastics, L. Robinson, Rotameter, Triplex, Martin Walter, Allen West, W. H. Willcox, and Zerny Engineering. I am particularly grateful for the helpful advice of the research team of Hovercraft Development, Ltd., and for the interest displayed by the Medical Research Council.

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Reviews of Books

Recurrent Dislocation of the Shoulder

H. F. MOSELEY, D.M., M.CH., F.R.C.S., F.R.C.S.(C.), director, accident service, and surgeon, Royal Victoria Hospital; associate professor, McGill University, Montreal. Edinburgh: E. & S. Livingstone. 1961. Pp. 163. 120*s*.

IN the Bodleian Library can be seen a manuscript sketch of a man removing the liver, kidneys, and heart from a corpse through an abdominal incision. This is held to be the earliest known picture of a dissection, but, though it is probably some 600 years old, there have been few radical changes since in the style in which textbooks are illustrated. Indeed, an examination of the engravings to be found in such works as the *De Fabrica* or Casserio's *De vocis auditusque* may suggest that some progress since then has been retrograde. Professor Moseley is to be commended therefore for his enterprise in using a new method to illustrate this book. Contained in a wallet in its cover is a stereoscopic viewer; and 35 colour photographs, examined through this, depict the anterior and posterior surgical approaches to the shoulder in a way which only an actual demonstration could better.

The author holds that there is no single " basic lesion " in recurrent dislocation, but that several conditions predispose to it. The most important is a separation of the soft tissues, or of the labrum, from the glenoid rim, with which is associated muscular atrophy and laxity of the joint capsule. Any large defect of the rim is, he holds, an indication for the insertion of a bone graft, or a vitallium prosthesis like the one he has designed, to supplement the conventional capsular repair.

Its illustrations apart, the volume is beautifully produced and is a comprehensive guide to the condition. Few of its readers will have realised that Winston Churchill's writings include a vivid and instructive account of the way in which a recurrent anterior dislocation is sustained: or that he acknowledges that he has had to refrain when speaking from " a too expansive gesture " which might have brought him to his knees.

Fundamentals of Acid-base Regulation

JAMES R. ROBINSON, M.D., PH.D., associate professor of physiology, University of Otago Medical School, Dunedin. Oxford: Blackwell Scientific Publications. 1961. Pp. 78. 9*s*. 6*d*.

THIS small and readable book is to be welcomed for at least two other reasons. Medical writing on this subject generally uses a terminology which has been discarded by chemists; and this book is a useful grammar of the Brönsted-Lowry nomenclature, which has many advantages. Beyond this, the expository talent which was so clearly displayed in Robinson's *Reflections on Renal Function* has now been as usefully extended to another field. At a very small expense of time and money, the reader can gain a real insight into this subject, which can otherwise be very confusing.

Aspects of Public Health Nursing

Public Health Papers 4. GLETE DE ALCANTARA and other contributors. Geneva: World Health Organisation. 1961. Pp. 185. 8*s*. 6*d*.

IN the first paper in this collection of contributions by nursing and other experts from various parts of the world, Esther Brown describes the world-wide growth of medical services, associated with an unexpectedly great increase in population since 1945, especially of old people, and the development of formerly underpopulated regions. On the other hand, it is hard to use ancillary personnel effectively, because hospital nurses are distributed unevenly; in the U.S.A. only 10% of hospital nurses work in the psychiatric, tuberculosis, and " chronic and convalescent " institutions that contain over 50% of all beds. Miss Brown describes the training of practical nurses and nursing aides and gives an account of the selection and training of Navajo Indian health workers.

Margaret Mackenzie discusses teamwork, emphasising that the public-health nurse needs to be fitted for her role as team-leader, seeing the auxiliary as someone to work with, rather than merely to supervise. Other contributors deal with the nurse's responsibility for health teaching, public-health nursing in the basic curriculum, and the public-health nurse and administration. Audrey Wood writes about the role of the midwife in public health, and there are descriptions of the work of the assistante sociale in France, of feldshers and nurses in the U.S.S.R., and of auxiliary public-health workers in Brazil. Louise Butt gives a heartening account of the establishment and development of a modern school of nursing in Nigeria, and Margaret Mead concludes this well-presented and readable volume by discussing the problems of the international nurse engaged in technical-aid programmes.

An Approach to Occupational Therapy

MARY S. JONES, M.C.S.P., M.A.O.T., senior occupational therapist in charge of occupational therapy at Farnham Park. London: Butterworth. 1960. Pp. 245. 42*s*.

IT is always hard to know exactly what it is that cures a patient; whether it is time and the healing hand of Nature, or a reorientation in the patient's outlook, with an acceptance of his disability and lessening of his emotional reaction to his illness, or the impact of the doctors' or therapists' personalities, hypnotising so to speak, the patient into being better—or whether there is some specific factor.

In rehabilitation by occupational therapy, all these influences play a part. Mrs. Jones prefers the term " reablement " which she defines as enabling those who have lost the use of some of their physical or mental faculties to lead once more a more or less normal working life in the community. It is clear that she and her colleagues at Farnham Park Recuperative Home are highly successful in this endeavour: firstly, in creating the right atmosphere and in instilling into the patient the desire to get better; and secondly, in attention to detail by which the patient is given the right type of occupational therapy—that is, something which will both interest him and also exercise the defective portion of his body. It is clearly desirable that whenever possible the remedial exercises should be interesting to the patient and should have an element of rhythm and encourage muscle coordination—particularly striking were the value of such procedures as beating copper for spinal disorders and cabinet-making for gastric disorders.

This is an excellent and comprehensive book with full details of the equipment needed to run a modern rehabilitation unit, and it can be thoroughly recommended to any hospital which has an occupational therapy department.

Essentials of Materia Medica, Pharmacology, and Therapeutics (8th ed. London: J. & A. Churchill. 1961. Pp. 444. 30*s*.).—The new edition of Prof. R. H. Micks' popular textbook will be welcomed by many. Written by a physician with first-hand knowledge of the action of drugs on patients, it will appeal particularly to medical students in their clinical years, for it is a concise and readable book with immediate applications to their hospital work. It has been brought as nearly up to date as possible—always a difficult task. The main omission is an account of the kind of evidence required before a new drug is accepted as a therapeutic advance; and a discussion of the designs of clinical trials could usefully be included in future editions.

Ventures in Professional Cooperation (*Mental Health in Clinic, Hospital and Community*. Association of Psychiatric Social Workers, 71, Albany Street, London, N.W.1. 1961. Pp. 100. 10*s*.)—This collection of lectures given at a course held in Oxford last year by the Association of Psychiatric Social Workers is partly a description and annotation of trends in psychiatric social work with the emphasis now on teamwork rather than on defining the boundaries of casework. The orientation is mostly psychoanalytical. Some views on collaboration in institution and child-guidance clinic are offered, and the booklet includes chapters on probation, the use of mental nurses in social aftercare from Moorhaven Hospital, the organisation of community services in Bradford, and the Family Discussion Bureau in London. Miss E. E. Irvine has edited the lectures.

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Achalasia

FOR the patient, achalasia is infuriating because unpredictable dysphagia and regurgitation make eating and drinking a purgatory; yet otherwise he feels perfectly well and is usually unaware of the associated hazard of pulmonary fibrosis and carcinoma of the œsophagus. To the physician or surgeon who sees a case only rarely, it is a confusing condition because of the variety of its presentation and its enigmatic ætiology. The extensive study of the disease by Dr. TROUNCE and his colleagues [1] at Guy's Hospital may well become a minor classic.

ELLIS [1] describes the natural history of the disease as an erratic progression through three stages. Stage 1 is the onset, usually with sudden development of pain, regurgitation, and dysphagia, which is often associated with an emotional disturbance. The pain is commonly intense, but may be a vague discomfort which for a long time is attributed to " indigestion " or peptic ulceration. Regurgitation is often mistaken for vomiting; and dysphagia may be overlooked at first, though later it becomes severe. GAMMIE et al.[2] found the radiological changes often so slight that they may be missed, but when disordered motility is appreciated at fluoroscopy the capacity of the œsophageal hopper is seen to be small and its walls contract violently. The diagnosis may be missed for months or years and the duration of the stage is appreciated only in retrospect.

Stage 2 is characterised by gradual decrease in the severity of the pain to substernal discomfort at the end of a meal. Dysphagia lessens, but the patient has to eat slowly; regurgitation is less frequent and more readily controlled; and weight loss ceases and may be recovered. The patient feels well, and, having found previous attempts at treatment of little help, may prefer to leave things as they are for ten to fifteen years; he certainly cannot see the need for operation. Minor respiratory infections are common and occasional major episodes occur, but the patient does not always relate these to his disease. Radiology, however, shows complete loss of the peristaltic wave with steadily progressing dilatation of the œsophagus, and it is this increase in size of the hopper and the diminishing violence of the œsophageal contractions in response to the stretch stimulus of a bolus that account for the amelioration of symptoms.

Stage 3 is the stage of decompensation. Substernal oppression becomes constant, with a feeling of being filled up to the cricoid. Spontaneous regurgitation is common, but usually it amounts to only a small mouthful that is swallowed again. Regurgitation at night, worsened by lying flat, is usual, and the patient is awoken by choking after inhalation.

Often recurrent inhalation pneumonitis leads to pulmonary suppuration and fibrosis, so that œsophageal difficulties now take second place to respiratory distress. All of ELLIS's 11 patients who reached this stage had severe " spill-over " disease, and 5 had polyarthritis indistinguishable from late rheumatoid arthritis. SCHULTZ [3] draws attention to the risk that achalasia may be missed as a cause of recurrent pulmonary disease in children, who seem to complain less about their dysphagia than adults. At fluoroscopy, if barium can be diffused through the pultaceous contents, a huge sigmoid œsophagus holding several pints is outlined. Death came earlier than expected in the majority of ELLIS's patients, and in at least half was directly attributable to œsophageal disease. The most striking finding was that, of 24 cases where the cause of death was known, 7 had carcinoma of the œsophagus.

Radiological [4] and manometric [5 6] methods have shown that the peristaltic wave is absent; the resting tone of the sphincter is normal, but it fails to relax with swallowing. For a long time the manifestations of the disease have been attributed to loss of ganglion cells in Auerbach's plexus or to imbalance of the autonomic nervous system influence on the œsophagus.[7–9] ADAMS et al.[1 10] found no ganglion cells or neurones in the body of the œsophagus, and much reduction in the number of ganglion cells, with some surviving neurones, in the sphincter segment. They suggest that inflammatory changes in the œsophageal wall are inconstant and are probably secondary to the stagnation of the œsophageal contents rather than to the process causing the disappearance of the ganglia. Histochemical studies [10] and pharmacological assays [11] showed absence of all cholinesterases in the body of the œsophagus with reduction in the amount of acetylcholinesterase and normal amounts of pseudocholinesterase in the sphincter, suggesting that the enzyme activity of the surviving neurones was normal. By taking strips of œsophageal muscle and stimulating their nerve-fibres, or applying drugs which blocked either adrenergic or cholinergic nerve-supplies, they showed that the body of the œsophagus had lost its nerve-supply, but that some persisting cholinergic innervation produced contraction of the sphincter. The adrenergic innervation of the sphincter which normally brings about relaxation could not be demonstrated in the samples of muscle from 2 cases of achalasia.[1] It seems likely that the cardiac sphincter fails to relax with swallowing because the final pathway of the reflex is by an adrenergic process which has disappeared.[1] The persistence of normal tone, demonstrated by the ease of passing a bougie or œsophagoscope or by manometry, and the continued transitory increase in tone in the sphincter shortly after the swallow at the time when the peristaltic wave would normally reach the sphincter,[6] is

1. Adams, C. W. M., Brain, R. H. F., Ellis, F. G., Kauntze, R., Trounce, J. R. *Guy's Hosp. Rep.* 1961, **110**, 191.
2. Gammie, W. F. P., Jennings, D., Richardson, J. E. *Lancet*, 1958, ii, 917.
3. Schultz, E. H. *J. Pediat.* 1961, **59**, 522.
4. Templeton, F. E. *Gastroenterology*, 1948, **10**, 96.
5. Creamer, B., Olsen, A. M., Code, C. F. *ibid.* 1957, **33**, 293.
6. Edwards, D. A. W., Rowlands, E. N. *Gastroenterologia*, 1959, **92**, 114.
7. Heyrovsky, H. *Arch. klin. Chir.* 1912-13, **100**, 703.
8. Hurst, A. F., Rake, G. W. *Quart. J. Med.* 1929-30, **23**, 491.
9. Alnor, P. *J. thorac. Surg.* 1958, **36**, 141.
10. Adams, C. W. M., Marples, E. A., Trounce, J. R. *Clin. Sci.* 1960, **19**, 473.
11. Trounce, J. R., Deuchar, D. C., Kauntze, R., Thomas, G. A. *Quart. J. Med.* 1957, **26**, 433.

explained by the persistence of cholinergic pathways. The loss of the peristaltic wave presumably results from disappearance of the myenteric ganglia of the body of the œsophagus.[1]

How, then, are we to treat this disorder? There can be no hope of return to normal function, and reduction of the resting tone of the sphincter seems the only possible method. Anticholinergic drugs have not proved successful, although intravenous hyoscine butylbromide has been claimed to relax the sphincter.[12] Dilatation, although easily performed, is unpredictable in its efficacy; only about half to two-thirds of patients obtain reasonable relief for long periods and then often only after several dilatations.[13 14] With this procedure the risk of œsophageal rupture is about 2%.[13] It cannot be carried out at all when the œsophagus is grossly dilated with sigmoid deformity; and where it can be carried out the greatest disadvantage perhaps is the danger of reducing symptoms to a level at which the patient will accept the disorder, unaware of the insidious progression towards stage 3. BRAIN [1] believes that Heller's cardiomyotomy is the treatment of choice, especially in the earlier stages, since fibrous strictures from food-stagnation œsophagitis and the development of carcinoma seem to be commoner in the large sigmoid œsophagus. BROWSE and CARTER,[15] reviewing their experience of the late results of cardiomyotomy in 15 patients followed for from four to twelve years, conclude that Heller's operation, though useful, achieves little. Only 7 patients were cured of their dysphagia, but 7 more felt it was much improved. 13 had no further regurgitation and felt that on this ground alone the operation was worth while. Pain was relieved by operation in 2 out of 5 cases. Radiological assessment after operation showed that 5 patients had no delay in emptying and no dilatation, while 9 had persistent obstruction and dilatation. No return of peristaltic activity was seen; but in about half the cases the œsophageal dilatation was considerably reduced—which seems to accord with the experience of other workers.[16]

Perhaps we expect more from cardiomyotomy than it can give. The most important aim of treatment should be to halt progression to stage 3. It seems likely that treatment by administration of nitrites is justifiable only while the patient is waiting for more vigorous treatment; they do not prevent progressive dilatation and are of little help in the earlier stages when the œsophagus can hold only a few ounces. Dilatation of the sphincter may be suitable during stage 1, provided that the extent of œsophageal dilatation is assessed radiologically at least once a year; but the advent of stage 2 is an indication for operation,[2 13] which should never be delayed until stage 3. How many have said after cardiomyotomy, undertaken after temporising treatment with nitrites or dilatations: "Why ever didn't you operate years ago?"

12. Wright, J. T. *Brit. J. Radiol.* 1961, **34**, 113.
13. Olsen, A. M., Harrington, S. W., Moersch, H. J., Andersen, H. A. *J. thorac. Surg.* 1951, **22**, 164.
14. Lawrance, K., Shoesmith, J. H. *Thorax*, 1959, **14**, 211.
15. Browse, N. L., Carter, S. J. *Brit. J. Surg.* 1961, **49**, 59.
16. Acheson, E. D., Hadley, G. D. *Brit. med. J.* 1958, i, 549.

Chemotherapy or Radiotherapy for Reticuloses?

LONG before any effective chemotherapy had been introduced, the treatment of reticuloses by X rays and radium had become well established. Special hospitals for radiotherapy had been built, and a widespread service for diagnosis and follow-up had been organised. The radiotherapists had collected an impressive body of information about the sensitivity of tumours and reticuloses, the best methods of applying radiotherapy, and the likely survival of the patients. Chemotherapy for tumours and reticuloses is based on the properties of nitrogen mustard, and nearly all the drugs used today are variations of this molecule. For tumours, radiotherapy remains the best treatment in nearly all cases. Chemotherapy is used only for palliation of tumours beyond the reach of radiotherapy or in special circumstances; for instance, CLIFFORD et al.[1] showed what could be done in malignant disease of the head and neck by a combination of nitrogen-mustard therapy and autologous marrow infusion: they used this method because X-ray therapy is not available in East Africa. In reticuloses, on the other hand, chemotherapy has advantages because the lesions are often multifocal and spread over various areas of the body. Radiotherapy is hardly ever used nowadays in chronic leukæmias: busulphan for chronic myeloid leukæmia, and mustine or chlorambucil for chronic lymphatic leukæmia, are the remedies of choice. But when the management of Hodgkin's disease and the similar reticuloses is to be decided, the choice between chemotherapy and radiotherapy is much less clear-cut. The subject has been debated by the British Institute of Radiology.

HOLME and KUNKLER [2] present the case for radiotherapy. They admit that when a reticulosis has become widespread such treatment is no longer worth while; but "where the disease is apparently still localised to one lymph node area or to the site of origin and adjacent nodes, the survival rate following radiotherapy is of the same order as that obtained in carcinomata of accessible sites". In a series of 48 patients with localised lymphosarcoma, the five-year survival-rate was 44%; for 86 patients with reticulosarcoma the rate was 30%. Adequate treatment has some drawbacks because not only the tumour has to be irradiated: the lymph-nodes draining the affected area and any probable line of extension from the primary area are also included. Thus, the irradiated area may extend "from the base of skull to below the clavicles—and doses of the order of 3,000r in four weeks must be given". The side-effects of such treatment can include loss of taste and smell, reduction of salivary secretion, radiation caries, radiation myelitis, and late affection of lungs, kidneys, bowels, and bones. Nevertheless, HOLME and KUNKLER believe that the method is justified by the results: the five-year survival figure for lymphosarcoma and reticulosarcoma of the tonsil was 55%, and for similar affections of the cervical nodes 62%. The survival-rate for apparently localised cases of Hodgkin's disease was 53%, and these workers note that

1. Clifford, P., Clift, R. A., Duff, J. K. *Lancet*, 1961, i, 687.
2. Holme, G. M., Kunkler, P. B. *Brit. J. Radiol.* 1961, **34**, 569.

local recurrence is rare so that supplementary chemotherapy is unlikely to improve the result: they agree with EDITH PATERSON,[3] who found no significant effect on prognosis when mustine was given simultaneously with X-ray therapy.

HANCOCK [4] states that in his hospital the practice is to treat generalised Hodgkin's disease first with chemotherapy, using either intravenous mustine or oral chlorambucil or both, which is followed by radiotherapy to any residual masses. He cites the figures published by COOK [5] of Michigan, who studied a group of 212 patients; about half of them had high-voltage X-ray therapy alone, and about half had X-ray and nitrogen-mustard therapy combined. The five-year survival-rates of the two groups were about equal, but, since most of the more advanced cases received combined treatment and the localised cases X-ray alone, COOK considers that combined treatment is the more effective.

JELLIFFE and NABARRO [6] report their experience with corticosteroids in the treatment of reticuloses. They recommend prednisone in doses of 30 mg. or more daily. On the whole their results were disappointing; but steroids are useful in hæmolytic anæmia when this occurs, and in the reduction of gland masses when further radiotherapy or chemotherapy is inadvisable.

No paper from this debate gives information about the results of chemotherapy alone. Many such reports have, of course, appeared [7]; but it is difficult to compare the reported results of pure chemotherapy and chemotherapy combined with X-ray treatment, for two reasons. The first is that few accounts of chemotherapy give results for four-year or five-year survival, and in many cases the drug on trial has been given to patients who had already received other forms of treatment. For example, WALL and CONRAD [8] have reported their experience with cyclophosphamide; they treated 29 patients with Hodgkin's disease, 28 of whom had previously received radiotherapy or chemotherapy or both; none of the patients were followed for more than a year. They reported " good " results in 10 patients on this short-term basis. The second reason is that few reporters give a clinical classification of the severity of their cases. WARWICK and SELLERS [9] divided cases into class I (disease limited to a single area), class II (disease involving more than one lymphatic group in a single anatomical area [a] without and [b] with constitutional signs and symptoms), and class III (generalised disease with serious constitutional signs and symptoms). The prognosis, based on four-year survival, is about three times as good for class I as for class III, with class II intermediate. Unfortunately, the usual practice, when both forms of treatment are available, is to give radiotherapy to patients in class I and class IIa, and to give chemotherapy to the more severely affected patients in classes IIb and III. This bias makes objective comparison between the two forms of treatment difficult. There are clinics where chemotherapy has for some time been given first in preference to radiotherapy: the figures for four-year survival with proper clinical grading in a series of patients so treated would provide a basis for a proper comparison.

Meanwhile most therapists follow the kind of scheme set out by BERSAGEL,[10] who uses a clinical classification resembling that of WARWICK and SELLERS. Stage-I patients are treated with X rays confined to the affected field and adjacent areas, sometimes combined with surgical removal of an accessible mass. Stage-IIa patients are also given X rays, but the treatment is necessarily more widespread; for stage-IIb patients chemotherapy and radiotherapy are combined. In stage-III cases chemotherapy, preferably intravenous nitrogen mustard, is relied on; X rays are used only for resistant local masses. Many workers are impressed, as HANCOCK is, by the value of combined radiotherapy and chemotherapy for the severer cases. Thus, ROOS and VIDEBAEK [11] in Denmark reported a five-year survival of 33% in a group of patients with Hodgkin's disease on radiotherapy alone, and of 41% in a group on combined treatment. On the other hand ROSENBERG et al.[12] considered that, in the treatment of lymphosarcoma in children, new methods had no advantage over radiotherapy. Clearly, more information from comparable series of cases is needed.

3. Paterson, E. *Brit. J. Cancer*, 1958, **12**, 332.
4. Hancock, P. E. T. *Brit. J. Radiol.* 1961, **34**, 573.
5. Cook, J. C. *Amer. J. Roentgenol.* 1959, **82**, 651.
6. Jelliffe, A. M., Nabarro, J. D. N. *Brit. J. Radiol.* 1961, **34**, 577.
7. See *Lancet*, 1959, i, 1233; *ibid.* 1961, i, 265.
8. Wall, R. L., Conrad, F. G. *Arch. intern. Med.* 1961, **108**, 456.
9. Warwick, O. H., Sellers, A. H. *Canad. med. Ass. J.* 1959, **80**, 423.
10. Bersagel, D. E. *in* Cancer Chemotherapy (edited by R. L. Clark, Jr.); p. 84 et seq. Springfield, Ill., 1961.
11. Roos, D., Videbaek, A. *Danish med. Bull.* 1959, **6**, 177.
12. Rosenberg, S. A., Diamond, H. D., Craver, L. F. *Ann. intern. Med.* 1960, **53**, 877.
13. Charney, J., Tytell, A. A., Machlowitz, R. A., Hillman, M. R. *J. Amer. med. Ass.* 1961, **177**, 591.

Annotations

POTENCY CONTROL OF SALK VACCINE

ONE of the main disadvantages of the Salk inactivated vaccine has been its relatively poor immunising potency against type-1 poliomyelitis infection, the most serious of the three types. Unfortunately this deficiency was not dealt with when the Salk vaccine was first introduced for general immunisation; for at that time more attention was paid to preparing large quantities of vaccine to meet the heavy demands than to increasing its potency. In recent years, however, work on the development of a more potent Salk vaccine has been intensified and the most encouraging results so far are those reported by Charney and his colleagues.[13] They have prepared a highly purified concentrated vaccine, the potency of which greatly exceeds that of vaccine prepared by the usual methods. Tests have shown that two doses of the purified vaccine are able to induce antibody responses to all three types of poliovirus in almost 100% of initially non-immune persons.

Although this is a major advance towards a more satisfactory Salk vaccine, there remains the problem of controlling potency in order to ensure that only effective vaccines are released for immunisation of man. An interesting approach to this problem is reported by Dr. Beale on p. 1166 of this issue. He has shown, using a number of different vaccines, that there is a direct correlation between their D-antigen content as measured by an in-vitro agar-gel precipitation test and their ability to induce the production of specific neutralising antibodies in 3-week-

old chicks. In fact there is a strong indication from his results that the D-antigen is actually identical with the immunising antigen. This precipitation test will no doubt serve a very useful purpose, especially in selecting satisfactory single-strain components for blending into trivalent vaccine. It must, however, be regarded only as a rough guide to immunising potency, since it cannot be assumed that there will always be a direct correlation when vaccines prepared by various methods are tested; immunising potency depends not only on the mass of the antigen but also on its physical state. The final laboratory estimation of potency, therefore, must essentially be one which tests the ability of the vaccine to produce specific neutralising antibodies in animals. The D-antigen test is in fact very similar to the flocculation test (Lf determination) used in estimating the potency of diphtheria prophylactic. This test gives an accurate measure of the quantity of toxoid but is by no means a consistently reliable guide to immunising activity, which is always finally tested by determining the ability of the prophylactic to produce antitoxin in animals.

One further point must be emphasised concerning the laboratory control of Salk-vaccine potency. It is important that the final animal test of immunising activity should be made in comparison with a reference vaccine which has been shown to give good protection in man. Only by this means will it be possible to make valid comparisons of the potency of vaccines tested at different times, or in different laboratories, and finally to reach a satisfactory agreement internationally on an acceptable level of potency.

MAINTAINING CONTACT WITH KNOWLEDGE

THE Boylston Medical Society at Harvard is the oldest medical students' society in the United States; but in his presidential address at its sesquicentennial banquet Prof. David Rutstein[1] was concerned with the fourth half-century rather than the previous three. "How," he asked, "can we maintain contact with medical knowledge?" By 1964 the number of medical articles published each year is likely to reach about 220,000, distributed among more than 13,000 journals; and, even if the present plans of the National Library of Medicine are wholly successful, 15–20% of them will not be indexed. Under present pressures, an effective programme of birth control for medical articles is not to be expected, and the growing mass of medical knowledge will become more and more unmanageable.

Part of the problem is that of storage and retrieval on demand. Modern paper, Dr. Rutstein said, has a probable life of fifty to a hundred years under casual conditions of storage; and even our present microfilm, being organic, is shortlived unless temperature, humidity, and the growth of fungi are rigidly controlled by continuous air-conditioning. On the other hand, computers have now reached a point where serious consideration can be given to the electronic storage of knowledge. "It is not far-fetched to plan on having an electronic console in the medical school or hospital that will print on high-speed tape the requested summary of a medical article stored in the memory of a computer in a distant central library." Success, however, depends on the applicant knowing what article he wants. "The major task lies not in the physical storage and retrieval of knowledge but in the preparation of an index that will give the user an approximate idea of the content of each article." Such an index can be made only by competent scientists or physicians familiar with the subject; and Dr. Rutstein makes the interesting suggestion that, when a journal sends a paper to a referee before publication, the referee should classify the paper professionally "by checking off items on a carefully designed form so that it might then be indexed by the librarian or by a computer system".

If, in addition, the referee were always asked to answer questions about such items as the nature of the sample under study and the appropriateness of the control group, fewer papers, perhaps, would see the light. Dr. Rutstein is eager that editors and readers alike should have more critical acumen and a higher threshold of acceptance, and in teaching Harvard medical students he and his colleagues take steps to foster scepticism. He recognises the difficulties of editors, "as they walk the tightrope between maintaining the freedom of the medical press and the more systematic supervision of the quality of published material"; but evidently he feels that the time has come when the art of editing should make more way for the science. A medium of communication on which he sets much store is the review article; but he would have the reviewer state far more clearly than is now usual his opinions of the significance of the findings or hypotheses he reviews. Recognised review articles could serve as a point of departure for research-workers and physicians, and would help the librarian to provide papers that will be in demand.

"If there were a general policy of not publishing poor articles, a systematic and efficient use of the critical review article in a supplementary indexing system, professional classification of accepted articles by the referee of the medical journal, effective use of electronic and mechanical aids for storage and retrieval and a mechanism for easy communication among medical journals, it is likely," Dr. Rutstein thinks, "that the needs of the research worker would be met." But, even if such a system were totally effective, it still would not suffice for practising physicians. To enable the practising doctor to maintain contact with medical knowledge, the period of his formal education must extend from the day he enters medical school until he retires. Responsibility for his teaching throughout that period lies with the medical schools. "No one else can do it."

1. Rutstein, D. D. *New Engl. J. Med.* Aug. 17, 1961, p. 321.

SCINTILLATION ENCEPHALOGRAPHY FOR BRAIN TUMOURS

LOCATION of a brain tumour by means of injection of radioactive solutions into the blood-stream depends on increased permeability of capillaries supplying the neoplastic cells. The "blood-brain barrier" is a complex function performed by the endothelium of the vessels and membranes composed of the vascular feet of the astrocytes.[1] Factors in the rate of transit of different substances include their electric charge and molecular size, regulating diffusion, and their relation to the metabolic needs of the cells, regulating "migration". The barrier may be disrupted by mechanical, thermal, chemical, and toxic injuries, neoplasm, inflammation, demyelinating diseases, and ischæmia.

The ideal way to delineate a neoplasm would be with a substance related exclusively to the metabolism of the tumour, but this has not been achieved. Alternatively,

1. Wislocki, G. B., Leduc, E. H. *J. comp. Neurol.* 1952, **96**, 371.

substances of large molecular weight may be used since these will pass at a detectable rate only through damaged membranes. One of the early substances used was diiodofluorescein.[2] Positron emitters such as ^{74}As and ^{64}Cu were used in turn,[3 4] but Chiro [5] has preferred the gamma emitter ^{131}I incorporated in radioactive iodinated human serum-albumin (R.I.H.S.A.) because it emits medium-hard gamma rays, has a short half-life, and attains equilibrium in the extravascular spaces by 8 hours and maintains it for 3 days. Because of these characteristics the dose can be kept down to 400–500 μC per 70 kg. body-weight. The substance is readily available and not too expensive: it is at present the most widely used gamma emitter. Chiro reports the results of its use in 400 cases, including 115 of verified cranial lesions. Of these 115, 60 had satisfactory contemporary neuroradiological investigation; and these were analysed to compare the methods for reliability. Detection accuracy was 83% by R.I.H.S.A. compared with 92% by X-ray methods; but the frequency of false-positive results with the latter method is not mentioned—presumably it was low.

The method used was to administer 10 minims of Lugol's solution three times daily for 3 days. On the 2nd day R.I.H.S.A. was injected intravenously, and on the 3rd day the head was scanned by the method of Shy et al. [6] Gamma rays were passed through a screen (collimator) of gold in which 12 tapering holes had been drilled. The rays reached a scintillation counter employing a 1 in.-thick sodium-iodide crystal to detect the 0·364 MeV gamma peak of ^{131}I. A photomultiplier converted the scintillations of light from the crystal into electric pulses, which were amplified and filtered to leave only the dominant peaks; these were counted and recorded by a solenoid stamper. The scanning method enabled the resulting pattern of dots to be charted on standard outlines of a head—anteroposterior, posteroanterior, and both lateral aspects being charted. The focused collimators provided a cut-off at 15 cm. from their surface. By this method most forms of tumour were detectable, including meningiomas, gliomas, 3 out of 4 acoustic neurilemmomas, craniopharyngiomas, and vascular abnormalities. Neoplastic cysts had a high uptake, and so, too, had collections of extravasated blood—a finding which indicates that the contents of a hæmatoma are in more active contact with the circulating blood than has been appreciated hitherto.[7] A porencephalic cyst, on the other hand, had a lesser uptake than normal tissue. Normal brain tissue on the surface gave a higher count than deeper structures, and accordingly tumours near the surface were more difficult to differentiate from surrounding cortex. Similarly, large muscle masses near the base produced a relatively high count; but, despite this, acoustic neurilemmomas were detected, and indeed, 5 out of 7 tumours in the posterior fossa were diagnosed. Tumours that were missed included pituitary adenoma and glioma of the brain-stem. Of the 5 cases missed by neuroradiology 3 were diagnosed by R.I.H.S.A. encephalography. Metastases of thyroid carcinoma, despite the administration of Lugol's iodine, gave a very high count.

An important advantage of scintillation-scanning is that the radioactive substances practically always delineate the tumour itself. Accordingly, this method can supplement indirect information from displacement of the ventricles or blood-vessels. Whether in early glioblastoma this advantage is likely to result in improved results is debatable, but the desirability of accuracy in diagnosis and prognosis is not in doubt. A cerebral tumour probably escapes detection very uncommonly in special units. But the diagnosis can be verified more rapidly and certainly by scintillation encephalography, or probing at the time of biopsy with a modified Geiger-Müller counter, after injection of a beta-emitter.[8 9]

2. Moore, G. E. *Science*, 1948, **107**, 569.
3. Wrenn, F., Good, M., Handler, P. *ibid.* 1951, **113**, 525.
4. Sweet, W., Brownell, G. *J. Amer. med. Ass.* 1955, **157**, 1183.
5. di Chiro, G. *Acta radiol., Stockh.* 1961, suppl. 201.
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7. Chou, S. N. Thesis, University of Minnesota, 1954.
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10. Corporal Punishment. H.M. Stationery Office, 1960.
11. Mays, J. B. Education and the Urban Child. To be published by Liverpool University Press.
12. Caning, Behaviour, and Delinquency in Secondary Schools: education officer's report to the policy and finance subcommittee of the West Riding of Yorkshire.

SPARE THE ROD

THOSE who advocate the reintroduction of corporal punishment as a judicial penalty believe that it would give the juvenile court a weapon with which to combat increasing lawlessness, and especially violence. Those who oppose it point to the findings of the Home Office Advisory Council on the Treatment of Offenders which, after carefully reappraising the evidence, decided that no case could be made out for its reinstitution.[10] The Home Secretary has accepted these findings but has not silenced his vociferous critics.

Side by side with the campaign to reintroduce judicial birching has gone a similar move to encourage greater use of the cane in schools. This move gains much of its strength from two general assumptions—that corporal punishment is more or less obsolete in British schools, and that school discipline is at a low ebb. Neither assumption is supported by objective evidence. The idea that "free discipline" is widely operated in State schools and that "blackboard jungles" are rife is unlikely to be accepted by anyone with a broad working knowledge of what goes on in the nation's schools today. For instance, Mays [11] has found that on Merseyside, an admittedly "tough" area, relations between pupils and teachers in slum schools are extremely sound and that disciplinary problems are few.

A small but interesting investigation in the West Riding [12] throws some much-needed light on this vexed topic. Thirty schools were selected, of which half were judged to be generally "good" in terms of behaviour and damage, and half "bad". Inquiries were then made to find out how the schools used the cane, under the three grades of "light", "medium", and "heavy"; and the proportion of pupils appearing in the juvenile courts from each school was calculated over a three-year period. As an indication of the social background, the rateable value per head of the local population and the number of persons living at a rate of more than two in a room at the latest Census were ascertained. The findings give no support to the idea that schools which cane most rigorously produce better behaviour or fewer delinquents. There was little difference between schools with different social backgrounds in regard to the extent to which corporal punishment was used; and the best-behaved schools did not necessarily draw their pupils from the socially most favoured districts. The main conclusion—"that behaviour is best and delinquency least in those schools where cor-

poral punishment is used sparingly ", irrespective of the type of locality—seems to vindicate the abolitionist view.

Fyvel's [13] study of the nature of youthful rebellion in a society moving towards affluence offers a challenge to those who assert that delinquency is the outcome of individual wilfulness. In a wide study of the youth culture of the most highly industrialised countries of Europe and America, Fyvel has confirmed that some of the social and economic forces operating in society as a whole are conducive to unrest among young people. Such a finding, though far from new to sociologists, has not hitherto exerted much influence on the general public because it compels us to ask painful questions about the nature of our social institutions rather than about the shortcomings of the delinquent minority: it suggests that youthful rebellion may result from social and economic frustration as much as from wanton aggressiveness.

ASCENDING URINARY INFECTION

As we have lately remarked,[14] the importance of the hæmatogenous route of infection of the urinary tract in the causation of typical pyelonephritis has been strongly emphasised, mainly as the result of experimental work and morbid anatomical findings [15]; but recent studies, both experimental and clinical, suggest that we should pay greater heed to the ascending route via the ureteric lumen, not so much in the blatant and rapidly fatal cases [16] as in mild, insidious, and often recurrent cases which may be called " pyelitis " no less aptly than " pyelonephritis ".

Andersen and Jackson [17] describe the establishment of persistent urinary infection in rats by a single retrograde injection of bacteria without renal trauma or urinary-tract obstruction. The inoculation was made into the urethra of female rats under very slight pressure with the hub of a needle, producing no urethral injury or obstruction. A similar inoculation with methylene-blue caused vesico-ureteral reflux; and, although there was no obvious distension of ureters or renal pelvis, the dye was seen to enter the distal ramifications of the pelvis. The inoculations with organisms gave positive blood-cultures in only 2 out of 24 animals tested. In the first test series, in which various coliform organisms were used, a single inoculation gave, according to the organism used, the complete gamut of lesions from severe or moderate acute pyelonephritis with abscess formation, through chronic lesions with numerous cortical scars or only mild scarring, to examples with no evidence of established infection. One animal infected with a klebsiella species showed only pyelitis, which persisted for seven weeks. In the second test series, this strain was used on 16 animals, of which 3 showed gross scarring but 11 gave pyelitis as the prominent lesion. When the animals were killed after two to thirteen weeks, culture from a slice of the cortex was often sterile and was positive only when medulla and pelvis also gave a positive culture (the medulla and pelvis were positive in 63% of the specimens). The anatomical lesions found in these kidneys were characteristic: in those with pyelitis only (most of the second series) there was mononuclear infiltration under the pelvic epithelium, not in the papillary part (the rat kidney is monopyramidal with the tubules opening into a single papilla), but in the parietal part and most notably in the apices and fornices (finger-like extensions of the pelvis into the medulla, usually collapsed and apparently functionless since no tubules open into them). In the first test series, where the infection was more severe and small scars resulted, these were mostly towards the lateral parts of the organs, not scattered at random over the whole surface as in the hæmatogenously infected kidney, while the most extensive lesions caused almost complete destruction of the whole organ. Andersen and Jackson believe that this pattern of lesions shows that the infection spread from the apices and fornices of the pelvis by contiguity through the medulla, involving interstitial tissues and tubules, and not by ascending the individual tubules. Thus, a low-grade infection may extend barely beyond the pelvis, while a slightly more virulent one involves only a wedge of the kidney, spreading laterally from the apex and fornix of the papilla, and causes only a limited fibrotic scar on the side of the organ.

The probability of the spread of organisms directly through the renal medulla has been neatly shown in another way. In investigations into the special liability of kidney tissue to coliform infections, Beeson and Rowley[18] found that, in the presence of serum, a suspension of kidney tissue would allow the multiplication of a culture of *Escherichia coli*, while suspensions of the tissues of other organs did not influence the rapidity and extent of destruction of the organisms by the serum. Beeson and Rowley showed that this was because the kidney tissue inactivated complement, and they narrowed the mechanism to an effect on the fourth component of complement—an effect which was apparently associated with the formation of ammonia by renal glutaminase. Thus the activity of the renal tubules permitted the multiplication of the organisms. This would enhance the spread of organisms through the renal medulla.

Clinical evidence suggesting that infection invades the kidney via the ureters has been coming from various quarters. While Kass [19] was showing that immediate culture of a fresh specimen of urine and counting the organisms could be used to help diagnose pyelonephritis [14 20] in females as well as males without the necessity of catheter specimens, he found that treatment of symptomless bacteriuria might prevent clinical attacks of pyelitis in pregnancy and also in diabetic urinary infection. This suggests that the infection spreads upwards from the lower urinary tract. Vesicoureteric reflux is also being widely studied. Forsythe and Wheelan [21] found that of 445 children examined by cystourethrography for enuresis (430), urinary infection (10), or miscellaneous symptoms (5), 30 showed reflux with no apparent abnormality of the urinary tract; and reflux was commonly associated with megaureter, particularly with pyelitis. Talbot [22] found reflux especially in association with infection, while Rosenheim [23] described how his colleagues found it in most cases of classical clinical and radiological pyelonephritis. Talbot also remarked on the interstitial nature of the renal cellular infiltration, which supports the experimental findings of Andersen and Jackson.

Lord COHEN OF BIRKENHEAD has been elected president of the General Medical Council in succession to Sir David Campbell.

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From Words to Wards

5. EFFECT OF ALTERATIONS

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IT is the demand of the Treasury and the Ministry of Health, the dream of administrators, and the wistful hope of architects that once the contract for the building of a hospital has been signed, there shall be no alterations. This counsel of perfection is more honoured in the breach than the observance.

Initial Requirements

The planning and building of a hospital is a major task calling for teamwork by the medical, nursing, and administrative staffs combined with the architects, consulting engineers, and quantity surveyors. Much of what is said here applies to all members of the team; but for convenience the words "doctor" and "architect" are used as representative of the medical and constructional interests respectively.

To achieve even qualified success in avoiding alterations the following conditions must be met:

(1) A clear statement of the requirements before planning begins.

(2) A clear brief on the standards of materials and finish to be used.

(3) A wide background of experience of the cost of building hospitals.

(4) Confirmation that all the items of furniture, fittings, apparatus, and equipment have been selected beforehand and are available for delivery in accordance with the building programme.

Lack of information on any of the above headings can result in alterations during the progress of the work. It cannot be overstressed that the planning of a new hospital calls for a complete statement of requirements, which is one of the best insurances against subsequent alterations. The preparation of such a statement is the most difficult phase of the preparatory work; for no *Building Note* issued by the Ministry of Health, and no single idea of doctor or nurse, can be accepted without careful scrutiny. Tact, diplomacy, and sheer hard work are needed for sound judgment on the many conflicting claims.

For a building as complex as a hospital, assembling all the facts and establishing the requirements is a long and slow business; and all too often this preparatory stage is ill considered and hastily executed. The Ministry of Health's *Building Notes* and *Bulletins* will do much to lighten the load. But in our democratic society we believe that the man "on the job" should be given a chance of saying what he wants. The drawback about referring planning matters to individuals is that they tend to base their requirements on their past experience and present accommodation, and not on future need; and often they find difficulty in foreseeing the advantages of a new plan or system. On the other hand, some have progressive ideas; and most of the advances in the planning of hospitals have originated from the clear thinking of medical and nursing staff.

Not uncommonly the interval between the decision to build a new hospital and its completion is of the order of ten years. During this time either doctor or architect may have second, and perhaps better, thoughts on the way in which particular buildings or rooms should be planned or arranged. Moreover alterations may be necessitated by medical advances that were unforeseen when planning was initiated. Most architects engaged in large-scale hospital work would regard some alterations as inevitable and necessary. But where hospitals are financed from public funds and the conventional contract system is operated, the architect is responsible for reporting on the cost and delays occasioned by alterations before the work is done; and often the discharge of this duty seems to the doctor to be an unwarranted interference with his legitimate desire to prevent "built-in" mistakes. The passage of any proposal to alter the plans is likely to be associated with some straining of the good relations between doctor and architect; but without this discipline a job could be reduced to chaos.

Flexibility and Speed

Experience of building shows that no plan be final; and it suggests the need for a quicker and more flexible type of building procedure, which would permit of variations, than is possible under a conventional contract.

The Ministry is understood to be studying ways of accelerating planning and building; a team of experts has visited the U.S.A. and has reported on the methods and organisation used in building hospitals. There can be no single, easy solution; but the objective of a quicker method of building must be keenly pursued, partly because this would reduce the need for alterations, and partly because hospitals must compete with other sections of the community for its share in the total building effort, and the present slow and complex procedure makes the construction of a hospital relatively unattractive to an industry fully committed in other directions: easier and more remunerative work for both contractors and workmen in all the building trades can readily be obtained.

The main obstacles to change in the contract system are administrative: officials are concerned that public monies not only should be properly spent but should be manifestly *seen* to be properly spent. "Public accountability" has become a dominant factor; and without doubt the conventional procedure of inviting tenders on the basis of a lump-sum contract, despite its drawbacks, is best suited to the administrative machine which controls public finance.

Three Examples

The following are three examples of the cause and effect of demands for alterations which may seem simple but are in fact costly in money and time.

Enlarging a Room

A member of the medical staff makes a legitimate request for a room to be enlarged by 5 ft. and for the position of the door to be altered. This modification might have the following effects:

(*a*) Movement of the electric conduits to the lighting switches and possibly rearrangement of power points and alteration of the lighting points themselves.

(*b*) Alteration of skirtings and floor finishings.

(*c*) Possibly movement of the telephone outlets and intercommunication wiring.

(*d*) Re-examination of the details of the sanitary fittings to ensure that the drainage and service outlets do not need amendment.

(*e*) The re-design of cupboards and joinery fittings.

(*f*) Possibly inclusion of additional dark blinds or furnishings to the windows.

(*g*) The return of the "dirty" and "wet" trades to areas already finished.

The cost of the work would depend on the stage at which the alteration was approved; but even if this were at an early stage the architects, consulting engineers, contractors, and specialist subcontractors would all be involved in giving effect to the amendment.

The cost of a drawing by the architects and consulting engineers may vary between £20 and £100 according to its complexity. A certain amount of alteration is expected at the early stages, and if the number of revisions is not excessive the professional men will normally not charge an additional fee. But the contractor and subcontractor are entitled to claim extra, to cover the cost not only of the workmen's time making the alterations but of the dislocation of their programme. Every good contractor likes to establish a rhythm of repetitive work on the site, and once this is interrupted the consequences are far-reaching. Where interruptions are the rule, all the building costs tend to become inflated. Over and above all this there are the interest charges on the capital investment in building plant and material, which in a large job may amount to over £1000 a day for every day's delay in bringing the hospital into use. Alterations may partly account for the relatively higher price paid for hospitals in this country than in the U.S.A., where alterations once a job has started are virtually unknown.

X-ray Department

In the past two years diagnostic X-ray equipment has changed greatly. Whereas formerly this heavy equipment was floor-mounted, today there is a widespread demand for it to be ceiling-mounted. This requires special provision in the structure, which in a large department may cost several thousand pounds. Even more fundamental changes would be necessitated by the introduction of automatic processing and automatic handling devices.

Change of Consultant

In the designing of special departments, where the advice of several consultants is sought in the early stages as many different solutions may be offered. When the consultant in charge of a special department—say, ophthalmology or otology—is replaced by another during the building of a new department, the newcomer may have an entirely different method of working and may accordingly seek structural changes.

During construction some flexibility is possible; the main limiting factors include the requirements for electrical services, hot and cold water, and drainage.

Conclusions

In the U.S.A. the "hospital consultant" has been accepted as an additional member of the planning and building team. He continues his duties after the planning stages, remaining with the new hospital to ensure that it is administered as it was designed to work—which goes far to reduce further alterations. Such an arrangement has much to commend it. In this country the main difficulty is in the recruitment of doctors or administrators who are sufficiently interested in planning to make this a full-time occupation and who will be accepted by the medical staff and architects as persons of knowledge and judgment.

Understanding between doctors and architects is impeded by the architect's use of the two-dimensional convention for plans, sections, and elevations and by his elusive reduction of work to varying scales, such as $^1/_8$ in. to 1 ft., or $^1/_{16}$ in. scale plans, or $^1/_4$ in. scale plans. The architect's familiarity with these conventions, which are his everyday tools invariably leads him to suppose that his clients are equally at home with them. How often has one heard the architect say to the doctor: "Well, you approved the plans", the doctor then confessing that he did not understand them.

A clearer understanding is often achieved by means of architectural models, which immediately bring to life the third dimension and which help in everything but the scale. Where space is available, there is no better solution than a full-size "mock-up" of special parts, especially if new ideas or equipment are proposed. If the mock-up can be erected in an existing hospital and used as a working prototype, it is better still. The planning of the ward units in the Kantonspital in Zürich is an example of Swiss thoroughness in this respect which must have paid enormous dividends both in actual cost of operation and in satisfaction of the staff working in the building.

Most medical committees include an "amateur architect" who claims to know what he wants and how he wants it. He or she can be very embarrassing both to architects and to promoters. Equally onerous is the architect who is the "amateur doctor". There is nothing more disastrous than a "confusion of experts" without proper leadership. The initial study and analysis of the requirement is a difficult and arduous task, which is primarily the responsibility of the doctor in conjunction with his colleagues and advisers. The efficient planning of the accommodation is the work of the architect aided by the doctors; and the architect is concerned with the best solution not only for any individual member of the staff but for all who are to use the new building. Understanding between architect and doctor will be greatly promoted if each has faith in good leadership and in *experto crede*.

Points of View

THE CASUALTY DILEMMA *

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THE valuable study of *Casualty Services and their Setting*, produced for the Nuffield Provincial Hospitals Trust, provides incontrovertible evidence that these services leave much to be desired. But the picture is presented as it is seen by only one of the interested parties—namely, the public. We may get further information if we shift our point of observation, and view the scene through the eyes of the man on the spot—which he is both literally and figuratively. What about the young man (or woman) who finds himself, with no specialised training whatsoever, confronted with an eight-hour spell (or more) of total responsibility for the reception and initial treatment of all "casualties" among perhaps a quarter of a million citizens?

THE CASUALTY SCENE

Maybe the first patient merely wants to know whether he ought to wear a truss on his ten-year-old rupture. Though feeling vaguely that this is hardly within the scope of "casualty", our young man conscientiously surveys the area, and on sudden inspiration advises the elderly caller to consult his own doctor. What with the old man's impaired hearing, and his slowness of speech, this interview has taken a considerable time; and another patient awaiting attention is deeply unconscious. In a laudable but abortive effort to secure a history, the puzzled casualty officer questions everyone within range; but meanwhile the moments, and the patient's life, are

* Abridged from a memorandum prepared for the Association of Hospital Management Committees.

slipping quietly away. Whose fault is it that this doctor has never before seen a case of barbiturate poisoning and does not know how to recognise it, let alone initiate its management?

A woman is sobbing in the corner of the reception room, what time she grasps a painful wrist. She is duly radiographed; the tyro scrutinises the dripping wet film with deep intensity; he methodically counts the number of carpal shadows and makes it eight. "No need to worry, madam, there are no bones broken!" Nobody ever told him that the line of fracture in a scaphoid bone may not be discernible in any skiagrams until some ten days have passed.

At the urgent insistence of a nurse, he leaves the swelling crowd lining up to see him and dashes along the corridor to examine an elderly lady who has fallen on to a protruding brick in her backyard. The old lady does not look too happy, but then senile people seldom do look happy in hospital. The abdomen is meticulously examined; there is no rigidity or special tenderness when the wrinkled parchment-like skin and atrophied muscles below are pressed down; our young doctor is sure of that. The pulse is normal: the old lady can go home. Until the coroner's inquest there is no one to inform the painstaking man in charge of casualty that the elderly subject has a three-inch tear down the length of her cæcum. Nor will anyone in the courtroom extend a word of sympathy to a young man who did his best.

So it goes on. Some in peril of their lives are brought in by stretcher. Alternating with them are hordes of attenders who have little or nothing wrong. All must be seen and examined by the casualty officer, who is expected to retain his aplomb throughout the kaleidoscopic scene. Relatives of the stricken are milling round everywhere and the noise is like Bedlam. Policemen and ambulance orderlies add to the chiaroscuro by tramping about on their lawful occasions.

Moreover, this normal basic clientele may be augmented at any moment by the arrival of multiple stretchers, the product of a hurtling motor-cyclist's impact with a bus-load of people.

Between his attempts to examine the injured, the casualty officer has to look to the interminable filling-in of essential X-ray request forms, blood-count demands, sensitivity-test requirements from the bacteriology department, and so on. Family doctors, too, are apt to be irate if they do not get a letter about every one of their patients seen. These have to be written there and then by hand. Even to fill in spaces on a form takes time. And the stream of people goes on. The human mass, like a tailless monster, undulates through the ever-open door from morning till night. Then it is succeeded by a fresh influx of trauma, very often under the influence of drink, and Bedlam gives place to Babylon.

To this work, be it marked, the young man comes utterly untrained and unprepared for what he finds. The attitude of the Establishment and of the public is that he is qualified as a doctor, and therefore he should be proficient in all that is needed—X-ray interpretation, anæsthesia, the use of plaster-of-Paris and everything else. Which is pure fallacy. Most men coming into a casualty department have never applied a plaster cast in their lives, and the material wrongly put on a limb can be a menace.

All the time the casualty officer works he is aware, in the recesses of his mind, that any error he may make can cover him in public obloquy. He can be pilloried by a coroner, brought to court by a litigious complainant, or abused by the local town council. And if any of these things happens, it is he, not the administrative machine, that will be blamed because he is attempting work for which he is not prepared.

By the end of the tour of duty the young aspirant to surgical fame may have come very near breaking-point. All day long he has argued and cajoled; he has been questioned and at times even suffered overt abuse. "I know what my rights are"; "It's me that pays your salary"; "I'm paying my contributions and you'll do what I want".

The whole scene is evocative of compassion, certainly; but to any untrained casualty officer, however well intentioned, the transcending reaction may be distaste. The department represents for him an anarchical upheaval of everything associated with the disciplined tempo of the rest of the hospital. "Degrading" was the epithet quoted in the Nuffield report and it came from a junior casualty officer. The senior houseman intuitively feels that in casualty work he must be prepared to lower his standards.

So unacceptable is the present casualty system to the aspiring young man that usually his greatest ambition is to leave it once and for all. It is thus that we find a situation of extreme paradox. From India and Pakistan come young men of medicine eager to learn from us, who once held the storehouse of their arts, and what happens? We grasp for their immediate assistance in preserving the very life of the hospital service from which they had sought to extract knowledge.

THE REMEDY

What is needed, I suggest, is an integrated self-contained casualty service, preferably on a national basis, in which the acolytes can be trained in the subtleties of the work. My preference is for a National Casualty Service rather than a regional one, because appointments and promotions in it would be more easily controlled. Already the formation of mobile surgical units—an integral part of any such accident service—is directly sponsored by the Ministry of Health.

What matters most, however, is that each casualty unit should have as its head a consultant of high attainment—ideally a man with surgical training and qualifications in industrial medicine. His primary function, apart from any special operative skills he may possess, is to be a father-figure to the young men who will make their career in the casualty service—translating into reality the platitude that casualty work can provide the young with invaluable experience.

In this day and age, specious talk of "under the supervision of" or "under the general direction of" extraneous consultants will not do. An experienced man, well tutored in human relations, must be on the spot to deal instantly with the crises which can arise in a flash. He requires consultant status so that his word shall be law as regards the admission of borderline cases, and he could, with advantage, be the referee for the Emergency Bed Service. He must be a consultant also because he has another important function to perform—namely, to protect his juniors against unfair criticism.

With their specialised training, young men would gain confidence and serenity; and ultimately a race of casualty officers would emerge who practised their chosen profession without fearing the consequences. A casualty

service must have an esprit-de-corps, and the heads of casualty departments have a duty to create it, by precept and example.

SIFTING PROCESS

At present the real casualty cases are muddled up with others which are utterly trivial or should properly go to their own doctor. Analysing one recent month's casualty attendances, in a typical industrial area, I found that, at the very least, 58% of the 3458 patients did not need hospital care. At a symposium held last year in Birmingham a London casualty consultant surgeon put the proportion of non-justifiable hospital attendance at 50%.

The casualty department has become the depository for any sort of service that does not readily fit into some other pigeon-hole. If a nurse feels sick, " send her to Casualty "; if medical examination of a prospective employee is needed, " send him to Casualty ". If a sebaceous cyst needs removal or a medical certificate is wanted, " send him to Casualty ". So on it goes, all day long—this protean demand on a department already overloaded and overworked.

Close on 200,000 road casualties for the holiday month of July in this country do not permit much of a lull in which casualty surgeons can remove sebaceous cysts or perform other enterprises of election much more suitably and aseptically dealt with in the clinics for outpatients.

Sooner or later we must have some means of selecting the cases to be accepted by casualty departments. We have not got the medical manpower to continue with the present open-to-all policy. If something of the sort is not done, the whole casualty system will break down; for (as we are warned) the supply of Commonwealth juniors will cease in two years' time and our home-bred young men will shun the posts. The policy of the Royal College of Surgeons in demanding that candidates for the fellowship must have had six months' casualty duty will never produce casualty officers who do the work for the love of it.

The public, too, should be made to understand, through Press and television, that X-ray diagnosis is not essential, or even advisable, in every case of injury. Often the fingers of an expert will give more helpful information than any X-ray tube. In point of fact those addicts to X-ray exposure who frequent casualty departments are probably harming their blood-forming apparatus by their pastime; and, if this were borne in upon the courts of law the fears of many a young casualty officer would be assuaged. In point of fact we who are employed in accident services know full well that very often it is not the patient who is being X-rayed but the spectre of litigation!

At present eleven million *casualty* attendances are being made yearly in the National Health Service, and the time has come when we must find a way of weeding out all ambulant attenders not requiring hospital attention. People have come to believe that the casualty department is a free dispensary for treating any manner of ailment whatsoever: they regard it as a good place to go to when the family doctor is having his half-day off; or they use it as a check on whether the treatment already being given by their doctor is right or wrong. The department becomes packed out with trivialities every weekend: " my doctor has no surgery today or tomorrow " is a common misrepresentation.

From time to time television programmes include a well-intentioned feature showing how 999 calls are dealt with by an imperturbable switchboard operator; and in the next few days there is often a spate of arrivals who are under the impression that this 999 machinery is just a fine free taxi service to the casualty department whenever there is any little upset or ailment in the home.

Within my own experience, a Second League footballer came to a casualty department after a 999 call at 11.45 P.M. His reason was that after the day's game his back had become somewhat stiff! Another gentleman, perfectly sane and equally sober, arrived by the same method; he was convinced that he had seen a ghost in his house, so what did the casualty surgeon think should be done? A newly wedded bride dialled the magic-carpet number and swiftly arrived to seek advice because a sinking feeling prevented her from composing herself to sleep!

One might suppose that the first-aid posts at factories would dispose of all trivial injuries there. But often the works doctor is a general practitioner who attends the first-aid post only for an hour five days a week. If a workman receives a bang or other little injury outside those hours, the factory nurse or the foreman—thinking of the firm's liability under the Workmen's Compensation Act—will send him to be " checked over " immediately by the hospital. In many factories, indeed, there is a standing order that every case of injury, however slight, must at once be taken by ambulance to the casualty department. In my view, the Industrial Medical Service should be integrated with the National Health Service, and first-aid posts, staffed by trained nurses and controlled by whole-time peripatetic medical officers, should be established in places where they would be accessible to *all* workers of every description.

To filter the trivialities from the essential cases is something that only a qualified doctor can do properly; but I think it can and should be done by someone of junior status; and in a National Casualty Service, such work would be, for the aspiring casualty surgeon, the first rung of the ladder. The apprentice casualty officer would have been tutored to explain in kindly and courteous manner exactly where the patient should go for treatment, and he would pass on all real casualties for the duty casualty officer's examination-in-chief. Not only would he work willingly, knowing that he would in due course graduate to the casualty officer's desk, but he would have a senior consultant of his own who would see that all the staff were buffered against demoralising investigations into vexatious complaints. An efficient smooth-working 24-hour service could then be offered to the public.

THE FUTURE

Casualty departments must march in step with all the exciting advances of modern medicine, and there are plenty of problems to be tackled in such departments——from the resistant staphylococcus to the improvement of resuscitation, the establishment and management of tracheostomy, the use of the compressed-air chamber in gassing accidents, and direct nodal stimulation in cardiac arrest. Many electronic devices, especially for measuring and recording circulatory changes, will soon be required in these departments; and already the artificial kidney and other extracorporeal circulatory machines, for use in extensive burns or other toxic states, are on their way to selected resuscitation units. A stimulating prospect for the 1970s is the development of ensuring that the injured at the site of the disaster have full benefit from avoidance

of movement, plasma perfusion, and perhaps hypothermia. That hackneyed phrase of the press reports—" the injured man was rushed to hospital "—is often the key to why he died. In the well-organised system of tomorrow the procedure will be the other way round: the hospital will be rushed to the injured man.

The expert traumatic surgeon does not have to become an outstanding operator in all the specialties; but he will have to be cognisant of the requirements of them all, and his function will be (as it always should have been) to document and to put the patient in a state of preparedness for the special skills of the appropriate department. He will doubtless have a particularly close alliance with one or more of the surgical compartments, such as the plastic and faciomaxillary unit; and he will usually need to take a special interest in brain injury. Indeed, when of sufficient seniority, he should be the ideal local deputy for the master neurosurgeon.

Last but not least among activities appropriate to the casualty officer would be rehabilitation. For the injured workman, tended in the casualty department, there are obvious advantages in being supervised by one expert, from the inception of his treatment to its termination.

SUMMARY

Our casualty departments make utterly unreasonable demands on the young doctors who are put in charge of them.

More than half the patients should not be treated at hospital at all. Efficient care of the remainder, including resuscitation and other treatment of accidents, demands progressive training of the casualty officers, who should find a satisfying career in this specialty.

A National Casualty Service is suggested; but, whether the service is national or only regional, the person in active charge of each casualty department must be a consultant, giving most of his time to this work.

Conferences

SKIN DISORDERS IN RELATION TO MALABSORPTION AND MALNUTRITION

Sir ROBERT PLATT, P.R.C.P., presided at a conference on Skin Disorders in Relation to Malabsorption and Malnutrition held at the Royal College of Physicians of London on Nov. 17. He explained that in 1959 Dr. F. Parkes Weber had given the college money to endow a triennial prize in dermatology. The terms of the gift had been made deliberately loose to enable the college to make the award for a lecture, essay, or other contribution to the advance of dermatology. The first use of the gift was to be the organisation of a conference on a subject of interest to dermatologists and general physicians, to include the first Parkes Weber lecture. In view of Dr. Parkes Weber's interest in numismatics, it seemed appropriate that a medal should be given to the prizewinner, and for this purpose a die had been provided by the British Museum. Dr. G. C. Wells then delivered a lecture on skin disorders in relation to malabsorption, after which the president presented him with the Parkes Weber medal.

Skin Disorders and Malabsorption

Dr. WELLS said that the skin was tolerant of wide variations of digestive function and diet. Even in gross malnutrition the skin, hair, and nails might remain normal. In malabsorption fæcal fat was increased, but the term steatorrhœa implied more than this. Historically the story began with tropical syndromes —Hillary's aphthoides chronica, consisting of vesicles and pustules on the tongue and in the mouth, giving rise to soreness. There was also perianal irritation and cold, dry, rough skin. Later, sprue was described in the Dutch East Indies and China. Manson-Bahr had described the associated dermatitis, pigmentation, and anæmia. The skin was dry and there were follicular keratoses. In 1888, Samuel Gee described non-tropical cœliac disease or idiopathic steatorrhœa, and later skeletal lesions and tetany were recognised as part of the disease: in about half the cases there were skin lesions, which cleared up with dietary treatment. Gregson observed dryness of the skin of the fingertips and patchy symmetrical pigmentation of the face. Snell had also commented on the patchy pigmentation and lacklustre hair of patients with this disease: the skin eruption might be petechial. Kaufmann and Smith discovered that the pigment was melanin and not iron as had previously been thought. Cook in 1953 described 100 cases and drew attention to the premature greying of the scalp hair and sparseness of that of the beard and axillæ. Skin lesions were observed in a fifth of these cases: there might be hæmorrhage into the skin, pigmentation, and rashes which were seborrhœic or psoriasiform; glossitis was common. Badenoch had also found pigmentation: in 15 of 163 cases there was dermatitis, and in 3 it had been the presenting symptom. Skin lesions were uncommon in children with cœliac disease.

From the dermatological side, a significant contribution was that of Konstam and Gordon, who in 1936 described the case of a man of 52 with eczema and pigmentation: the skin was vesicular and lichenified. Two years later it was found that he had steatorrhœa and macrocytic anæmia. Gethin-Jones and Wigley in 1939 described a patient with steatorrhœa and chronic pigmented dermatitis. He was a man of 39 with exudative eczema followed by pigmentary change. Two years after the onset of the skin disease he had developed abdominal pain and loss of weight. At the age of 42 he was admitted to hospital, when, besides the pigmented dermatitis, he had angular cheilitis. It was found that he had steatorrhœa, and after treatment with a low-fat diet he made a good recovery. Five years later he had been seen by Dr. Wells and showed dry discoid eczema: he still had steatorrhœa and again responded to treatment. Dr. Wells then described a man who had attended St. John's Hospital for Diseases of the Skin for three years on account of patchy eczema of the limbs which had developed into an exfoliative dermatitis with pigmentation. He had been admitted to the London Hospital under Dr. Brian Russell, who found that he had macrocytic anæmia, steatorrhœa, and hypocalcæmia. He was given a high-protein, low-gluten diet and recovered. A 3rd case was in a man of 53 with an itchy eczema who a year later began to lose weight and suffer from diarrhœa. He was found to have raised fæcal fats, macrocytic anæmia, and hypoproteinæmia. He did well on a low-fat diet: in retrospect it seemed likely that he had had a protein-losing enteropathy. A 4th case occurred in a man of 32 with extensive intertrigo which by the age of 37 had developed into exfoliative erythroderma. Five years later he began to lose weight and passed three stools a day: he had an ulcerated tongue. He was found to have macrocytic anæmia, and jejunal biopsy showed the changes of idiopathic steatorrhœa. He recovered on a gluten-free diet and folic acid. A 5th patient had had acute dermatitis due to a hair dye, followed by itchy eczema of the legs. There was loss of weight but no bowel symptoms: nevertheless steatorrhœa was present. In review, several of the cases had appeared " seborrhœic " at onset, and there seemed a definite tendency for the rash to be worst in the flexures. When pigmentation occurred it was in the lesions. Only 1 of this series had shown hypocalcæmia, and the interval between the development of the skin lesions and manifest steatorrhœa had been between two and ten years. What was the nature of the link between bowel and skin lesions ?

In general malnutrition (i.e., starvation) the skin was pale, œdematous, and dry. There were an acquired ichthyosis which might involve follicles, pigmentation, and changes in the hair and nails. It seemed likely that the principal factor here was lack of protein or possibly essential fatty acids. These changes had been seen during the wartime famine in Holland, by the team studying the results of starvation in the population of Wupperthal, and in the Minnesota experiment where 32 volunteers had been maintained on a low-calorie diet. Characteristically, there were polygonal squames: the skin was dry from lack of sweating and lack of sebum. The pigmentation might mimic that of Addison's disease but was not adrenocortical in origin: imbalance of aminoacids might be responsible.

Deficiency of fat-soluble vitamins might be thought to account for the cutaneous symptoms, but genuine signs of vitamin-A deficiency were rare. Lack of vitamin D accounted for the hypocalcæmia, but the latter was inconstant. Deficiency of vitamin K interfered with prothrombin synthesis and was held responsible for the ecchymoses. Signs of vitamin-C deficiency were not usually encountered in the steatorrhœic group of patients, and pellagra was rare. The sore atrophic red tongue was seen where there was vitamin B_{12} deficiency and anæmia. Folic-acid deficiency was common and folic acid was useful in treatment.

Dr. Wells felt that several irrevelant skin disorders had been described in relation to steatorrhœa, such as urticaria and herpes simplex. Prurigo nodularis had been seen in an adult with cœliac disease, and the prurigo had disappeared when the cœliac disease was successfully treated.

Eczema and steatorrhœa were rare in simple malnutrition, and in his cases the eczema had not followed an ichthyotic state such as might arise in malnutrition: moreover, it had preceded the steatorrhœa. Histologically there seemed to be reduced epidermal shedding. In psoriasis and exfoliative eczema there was loss of sulphur-containing aminoacids in the shed keratin. Pegum had shown that in exfoliative dermatitis the loss of protein might amount to 19 g. a day. This compared with a turnover of $2^1/_2$ g. a day for red cells and no less than 50 g. a day in the intestinal epithelium.

He had found that exfoliative dermatitis was commonly associated with deficiency of folic acid.

Stress and the Epidermis

Prof. W. S. BULLOUGH, speaking on the effects of stress on the mitotic activity of the epidermis, said that in man cellular division in the epidermis occurred mainly in the suprabasal layer, whereas in the mouse mitosis was most frequent in the basal layer itself. When mice were stressed, as by making them work a wheel, epidermal cell division was inhibited. The effect of starvation was the same: it was another kind of stress. This effect could be duplicated by putting thin slices of mouse skin into saline without nutrients. When glucose was added, there was a great burst of mitotic activity. What was happening was that, when cellular division was inhibited, there was not total cessation of activity: in fact cells continued to get ready for division, such cells accumulated, and when circumstances permitted them to divide they went rapidly ahead. It had seemed likely that in starvation some substance inhibited cell division and that in the saline explants this substance was diluted or washed away. It followed that it must be water-soluble and was therefore not a corticosteroid. After many attempts which failed, adrenaline was discovered to act as the responsible agent. The diurnal rhythm was due to inhibition by adrenaline during the periods of activity with phases of recovery during rest and sleep. In wound healing, the rate of cellular division was ten times the normal without a diurnal cycle and was very resistant to the effects of adrenaline. After excessive stress or, experimentally, the exposure of healing tissue to great amounts of adrenaline, cell division was damped down.

He had been told that surgical wounds healed better if the patient was allowed home than if he remained in hospital. Hospitals had been criticised as noisy places where patients were woken early and were constantly being disturbed. Patients had been heard to say that they were going home for a good rest. These experiments might be held to show the great value of rest in the healing of injured tissue and hence in the treatment of sick people. The reason why mitoses were rarely seen in human epidermis was that specimens of skin were likely to have been taken during the day, when adrenaline levels were high.

Mouth Lesions

Dr. JOHN BADENOCH, discussing the lesions in the mouth in malabsorption, limited his remarks to the symptoms produced by lack of folic acid, vitamin B_{12}, and iron.

In the malabsorption syndrome, glossitis and stomatitis commonly preceded other symptoms. They had occurred in 118 out of 163 cases he had studied and were the presenting symptom in 12. In tropical sprue there was dysphagia; and, although this was attributed to lack of B vitamins, it might persist despite treatment with them and with iron. Possibly deficiency of protein was responsible. It had been thought that the absorption of toxic substances from the gut caused both skin and mouth lesions. Hunter's glossitis, however, might precede the development of other symptoms by many years. In 1955 he had studied a group of vegans (strict vegetarians) with vitamin-B_{12} deficiency. They had had periodic glossitis without associated hæmatological changes: 72 had glossitis, 17 cheilitis, and 13 stomatitis. If the mouth lesions of pernicious anæmia were due to deficiency of vitamin B_{12}, why did some patients escape having them, and why did some relapse during hæmatological control?

In iron-deficiency states there was pallor of the tongue, which was smooth and sometimes painful and might be cracked. There was at times an associated dysphagia, and a web of tissue across the œsophagus at the level of the larynx could be demonstrated radiologically. Histological studies of the tongue had shown hyperkeratosis and atrophy of the underlying mucosa. The filiform papillæ were absent and there was a chronic inflammatory infiltrate in the submucosa. The muscle coat of the œsophagus was atrophic. There was a loss of melanin in those with painful mouths. Dr. Badenoch thought that in vitamin-B_{12} deficiency there was an increased susceptibility to irritation by non-specific factors. In iron deficiency the changes were not correlated with the degree of lack of iron. They were less common in children or young people. The explanation of this might be that in older people anæmia was due principally to hæmorrhage and the avid bone-marrow called strongly for available iron, whereas in the young all tissues were competing equally.

Skin Changes in Hypocalcæmia

Dr. M. GARRETTS spoke on 4 cases of dermatitis associated with hypocalcæmia—1 due to permanent hypoparathyroidism from accidental removal of the parathyroid glands during thyroidectomy, a 2nd with temporary parathyroidism, a 3rd with steatorrhœa, and a 4th in an adult patient with cœliac disease. Since describing these cases with Prof. Charles Dent he had encountered further cases, and 11 of them were now established. In these cases there were several different causes of hypocalcæmia, and several different treatments had been used. Control of the skin symptoms seemed to be related to the maintainance of adequate serum-calcium levels alone. Such cases must be rare, and Simpson had not concluded that hypocalcæmia was the cause of all the dermatological troubles of patients with steatorrhœa. In a case described by Garretts and Dent, a girl of 12 had suffered from a curious eruption like crusted psoriasis together with horny follicular spines. She had latent tetany, but elevation of the serum-calcium with dihydrotachysterol failed to influence the eruption: in fact it grew worse. She was then shown to have abnormal light adaptation, but the fat balance was normal. Treatment with vitamin A by mouth had cured the skin disease. In this case there was evidence of essential hypoparathyroidism associated with bizarre anomalies of the metabolism of vitamins A and D.

Medicine and the Law

Automatism

AUTOMATISM has been judicially defined as "unconscious involuntary action". The condition negatives criminal liability because the patient "is not conscious of what he is doing . . . the mind does not go with what is being done".[1]

The principles involved are illustrated by two recent cases. In Bratty *v.* Attorney-General for Northern Ireland,[2] B. killed a girl by a blow, followed by strangulation with a stocking; the girl was a family friend and there was apparently no sexual assault. At his trial for murder, the defence put forward three alternatives in the following order:

1. That B. was at the time in a state of automatism, the only cause suggested being psychomotor epilepsy.
2. That B.'s mental condition was so impaired and so deficient in reason that he was incapable of forming an intent to kill or cause grievous bodily harm, and so B. ought not to be convicted of anything more than manslaughter.
3. That B. was guilty but insane within the McNaughten rules.

The trial judge refused to leave the first two defences to the jury; and, on the evidence, the jury rejected the third. (The defence of diminished responsibility is not available in Northern Ireland.) B. was accordingly convicted of murder.

B.'s appeal ultimately reached the House of Lords. Dismissing the appeal, their Lordships said that the only cause suggested for the alleged automatism was a defect of reason within the McNaughten rules; the jury having rejected the McNaughten defence, there was no room for an alternative defence of automatism. This does not mean, however, that the defence of automatism can never be put forward as an alternative to a plea of insanity. Lord Kilmuir gave an illustration:

"It might be alleged that the accused had a blow on the head after which he acted without being conscious of what he was doing or was a sleep walker. There might be a divergence of view as to whether there was a defect of reason from disease of the mind . . . The jury might accept the evidence of a defect of reason from disease of the mind, but might at the same time accept the evidence that the prisoner did not know what he was doing."

Their Lordships also laid down certain important rules of procedure. These may be codified as follows:

(1) The defence must lay "a proper foundation" for a plea of automatism. (2) The only proper foundation is evidence; this may be the evidence of the defence's own witnesses or it may emerge from cross-examination of a prosecution witness. (3) Once the defence have laid a proper foundation, the onus of proof passes to the prosecution, and it is for the jury to decide whether the prosecution have made their case.

In the other recent case, a Dr. B. had been convicted at quarter sessions of dangerous driving and driving under the influence of drink, after a hospital dance. He had had five or six whiskies and some coffee. Two senior nurses described his condition as normal. He left by car at 1.15 A.M. Although his house was only two minutes' walk from the hall where the dance was held, he was seen driving erratically at 3.20 A.M. The police found blood on his shirt and a heavily bloodstained handkerchief; the car was damaged. It was reasonably certain that the car had been involved in a collision, but there was no evidence as to how or when this had happened. A police doctor examined Dr. B. at 3.50 A.M. and stated that he was under the influence of drink; at the time of his examination, the police doctor was aware that Dr. B. had on two previous occasions been the victim of concussion.

Dr. B.'s explanation was that, as a result of the collision, he was in a state of automatism for the rest of the journey. The particulars of the dangerous driving charge were limited to what the police had seen at 3.20 A.M. but the charge of driving under the influence of drink was not limited to this particular incident. Automatism was put forward as a defence to both charges.

The trial at quarter sessions came on before the decision of the House of Lords in the Bratty case, and the deputy chairman had directed the jury that the onus of proof as to automatism rested upon the defence. Dr. B. was convicted on both charges.

The Court of Criminal Appeal held that Dr. B. had laid a proper foundation for a defence of automatism, and the burden of proof was therefore on the prosecution. The conviction for dangerous driving was accordingly quashed. But the misdirection to the jury did not colour the perfectly clear conviction of driving under the influence of drink, and this conviction must stand.[3]

1. Bratty *v.* Attorney-General for Northern Ireland.
2. (1961). 3 All E.R. 523.

Public Health

Iodine 131 in Milk

THE mean iodine-131 content of the daily milk samples examined by the Agricultural Research Council Radiobiological Laboratory during the past four weeks are:

Week	*μμC per litre*
Oct. 15–21	114
Oct. 22–28	158
Oct. 29–Nov. 4	127
Nov. 4–11	117

The survey of iodine 131 in milk in the United Kingdom has been in progress for eight weeks and an analysis of the combined results of the daily and countrywide sampling now enables the overall situation to be assessed in terms of the recommendations made by the Medical Research Council—namely, that the acceptable radiation dose would not be exceeded for infants under one year of age, the most susceptible age-group of the population, unless the average concentration of iodine 131 in milk rose above 130 μμC per litre over a period of one year or higher concentrations were maintained for correspondingly shorter periods. This recommendation took into account the likely extent of variations in the contamination of local milk supplies. The following figures show that in different regions of the country between 9% and 20% of the specified annual total had been reached on Nov. 11, the countrywide average being 14%:

Results of Daily and Countrywide Sampling of Milk for Iodine 131 during Eight Weeks Sept. 16–Nov. 11

Zone	*Average contamination (μμC per litre)*	*% of quantity which would give rise to annual average specified by M.R.C.*
1. Northern England	103	12
2. North West England	98	12
3. East and East Midland	72	9
4. West Midland	106	13
5. Wales	165	20
6. South and South East England	94	11
7. Mid-Western England	100	12
8. Far Western England	133	16
9. Scotland	157	19
10. Northern Ireland	164	19
Countrywide mean	115	14

Regional differences can result not only from climatic and geographic factors but also from differences in the diet of cattle. The quantity of iodine 131 they consume depends primarily on the quantity of fresh grass they eat; thus, recently deposited fission products enter milk less readily when, with winter coming on, cattle are provided with increasing quantities of other foods. In 1958, after the previous series of weapons trials in the Arctic, this effect was notable from the middle of

3. *Times*, Nov. 8, 1961.

November onwards, and results from Scotland suggest that it is happening again. It cannot, however, be assumed that the contamination of milk will decrease steadily in the future, because for some weeks after the detonation of nuclear weapons the rate of deposition may vary widely, depending on meteorological factors.

Bronchitis in London

The prevalence of bronchitis in London is reviewed by Dr. J. A. Scott, the county medical officer of health, in his annual report for 1960 [1].

Male death-rates from bronchitis for both London and the country as a whole are double the corresponding rates for females. In London the average annual male death-rate from bronchitis per 1000 population in 1951–60 was 0·26 at 0–4 years of age, 0·03 at 5–44, 1·46 at 45–64, and 9·58 at 65 and over. At ages 45–64 the male rate was five times the female rate, and at 65 and over it was two and a half times the female rate. This sex difference may be partly explained by smoking—particularly cigarette-smoking—habits. The sex differential is tending to shift towards the later ages; and this shift may be associated with the extension of smoking among women—an extension which developed after that among men.

Standardised mortality ratios show that in London, whereas mortality in general differs little from the national average, that from bronchitis is substantially higher in each sex. In London the geographical pattern of mortality from bronchitis is characterised by high ratios except for a wedge of low ratios running from Hampstead, Paddington, and Kensington in the north-west through St. Pancras, Chelsea, Westminster, and the city to the river. On the south side of the river the ratios are comparatively low in the boroughs towards the periphery of the county.

For both males and females mortality from bronchitis is highly correlated both with percentage in social classes IV and V and with percentage born in London; and the percentage in social classes IV and V is also highly correlated with the percentage born in London. Partial correlation coefficients show that percentage born in London is more important than social class—a conclusion which accords with Dr. Scott's observation in his report for 1956 that " There is little doubt that living in London for a long period increases the risk of dying from respiratory disease, particularly bronchitis."

Smoking by Schoolchildren

The annual report of the Medical Research Council of Ireland [2] includes a summary by Dr. M. D. Flynn, county medical officer, Westmeath, of an inquiry into the smoking habits of schoolchildren in his area.

The inquiry, which covered all secondary, vocational, and large primary schools, was made by means of a questionary which was completed anonymously. At 11 years of age 12·8% of boys and 2·6% of girls smoked one cigarette or more a week, and at 15 years the corresponding figures were 28·8% and 10·7%. Smoking was commoner in towns than in rural areas; and it was almost twice as common among children where both parents smoked as among those where neither parent smoked.

Many children, particularly boys, had smoked their first cigarette before their 10th birthday. The main reasons for taking a first cigarette were " out of curiosity " and " given a cigarette ". The cinema was commonly named as a place of occasional smoking. Of those who had stopped smoking 8·5% of boys and 6.5% of girls gave " fear of lung cancer " as the reason. " There is an urgent need for increased anti-smoking education of school children and of the general population, if the rising incidence of lung cancer is to be halted and reversed. The indications are that many children will react favourably to such education if the facts are convincingly presented and discussed."

1. Report of the County Medical Officer of Health and Principal School Medical Officer, 1960. Published by London County Council, County Hall, Westminster Bridge, London, S.E.1. Pp. 162. 4s.
2. Annual report of the Medical Research Council of Ireland, 1960. Issued by the Council, 50, Merrion Square, Dublin.

Special Articles

GENERAL MEDICAL COUNCIL

AT the opening of the Council's 203rd session on Nov. 21, Sir DAVID CAMPBELL reviewed the events of his twelve years as president. He is to be succeeded by Lord Cohen of Birkenhead.

In 1949, save for minor matters, the Medical Act of 1858 which established the Council had been amended only once, and that was as long ago as 1886. Since then three Medical Acts—those of 1950, 1956, and 1958—had been placed on the statute-book.

In the field of discipline, three points might be mentioned. First, whereas in 1949 applications for restoration to the Register were dealt with by the Executive Committee in camera on the basis of documentary evidence alone, they were now dealt with in public by the Disciplinary Committee; and the applicant might, and usually did, appear in person and might be legally represented. Secondly, on the recommendation of the Council the Act of 1950 gave to a practitioner the right of appeal, on points both of law and of fact, to the Judicial Committee of the Privy Council against a determination of the Disciplinary Committee to erase his name from the Register. Six such appeals had been made; and in every case the decision of the Disciplinary Committee had been upheld. Thirdly, the introduction of the National Health Service had affected the disciplinary machinery, for it led to the hearing of cases which in the past seldom or never came before the Council—the type of case, for example, in which a doctor was charged with grossly neglecting his personal responsibilities to patients.

In the field of education by far the most important change was the introduction of a compulsory period of responsible clinical practice under supervision in an approved hospital before full registration—the so-called " intern " year. The advantages of such a method of compulsory training were two-fold. It stressed the educational aspect; for it imposed fairly and squarely on the universities the duty of approving hospitals and posts, of keeping an eye on the nature of the training and experience to be had therein, and, if dissatisfied, of withdrawing approval. And it was bound in the long run not only to improve the standard of medical care in every hospital by the educational atmosphere engendered, but also to be the best insurance available to the public against incompetent and ignorant practitioners.

There had been changes, too, in the views of the Council on the curriculum. The 1947 Recommendations, following the policy which had prevailed for more than fifty years of imposing somewhat rigid requirements, had tended to discourage initiative and experiment. Those of 1957, from which a good deal of detail had been eliminated, so far from discouraging medical schools from experimenting, insisted that they had " a right, which may equally well be described as a duty, to experiment with different courses and various methods of teaching ".

In the twelve years of Sir David's presidency relations with the Commonwealth and foreign countries had lost nothing in cordiality. Indeed in many ways they had become closer. In 1949 there were only 30 universities and other bodies whose primary qualifications were recognised by the Council on the basis of reciprocity. The figure was now over 50 and might well increase in the near future. In 1949 the names of 516 practitioners from the Commonwealth were added to the Register. This year the number would exceed 2000—over 1500 fully registered and nearly 500 provisionally registered. To that must be added those who were registered temporarily. Last year more than 1700 certificates of temporary registration were issued, compared with only 80 in 1949. These figures indicated the extent to which Great Britain attracted Commonwealth and foreign doctors for postgraduate training and reflected the prestige of British medicine in countries overseas.

In England Now

A Running Commentary by Peripatetic Correspondents

WHAT a splendid controlled experiment is going on in Harley Street at the moment. One end is clotted with cars, double-parked all along, and the other is spacious between parking meters. What horrors and groans there have been about the dire consequences of not letting every consultant park just where he liked. Is anyone using this unique opportunity of measuring the losses (or benefits)? Here we have two blocks of consultants, well-matched for skills, specialties, hospital appointments and so on—or if not, it would be nice to see the irregularities in the distribution—and *one block can park at their doors and the other can't*. How many patients advised by each group are dying daily because the specialist can't arrive in time? How many students taught by each group are failing final M.B. because the great man is paralysed for lack of transport? How many merit awards have been lost by non-attendance at the right places (wherever they may be)? How many wives have been unable to get home from the West End because the car isn't outside their husband's consulting-rooms? And in all these ways which group comes off worst? (It doesn't look as though the cars in the bottom layer where parking is "free" are good for getting anywhere in a hurry.)

Or is there a difference in the kind of doctors at the two ends which would invalidate the comparison? And if so, will anyone admit to being at the wrong end of Harley Street?

* * *

The first shop I visited did not deal with duty-free liquor for export purposes. They referred me to a store known as Fortnum & Mason, which I was told was near Piccadilly. I approached a bobby at Piccadilly Circus and inquired as to its exact location. There are many stores there and I assumed that he might not know it, so I added helpfully, "It's a liquor store." With all the aplomb that one expects of your bobbies, he politely sent me off in the right direction. My astonishment at what I found you can well imagine. Just the way they display marmalade is typical. I never knew anyone even thought about *vintage* marmalade, much less put it in jars.

* * *

The discovery and investigation of the Metalloid Cultures of Planet Sol. III has been of absorbing interest to all Rigelians since the first interstellar expedition came back with evidence of life in the remote past on that planet. These former inhabitants apparently possessed that biological archaicism an endoskeleton; they had four limbs, two propulsive, two prehensile; and this endoskeleton was articulated by a multitude of primitive joints. The first expedition made its planet-fall on a small island in the northern hemisphere situated just off a major land mass. It was here that the Metalloid culture was first found, though later excavations showed the custom to be widespread throughout the planet. The term "metalloid culture" describes a peculiar habit of these animals. Parts of their endoskeleton were decorated, sometimes even replaced, by inserts of a foreign material, usually, though not invariably, metallic. These inserts varied from simple structures (a short rod with spiral chasing around its shaft is often found driven into or lying in a cavity in a part of the skeleton) to increasingly complex angular and spherical artefacts which are attached to, embrace, or even replace those parts of the endoskeleton taking part in articulations.

After a prolonged study some conclusions began to emerge and we now have a clear general picture of the social structure of these animals, though naturally at this distance of time some trivial details will be forever lost to us.

There were two societies coexisting side by side, the metalloids and the non-metalloids. Comparison of their skeletal remains shows that the animals of these two societies were biologically identical. Therefore the metalloid custom must have had some social or religious significance. Whether the two societies coexisted in peace or enmity is not known for certain; that the metalloids were of a higher intellectual order is possible, for some of the artefacts are of an astonishingly high standard of beauty and design. Alternatively, it has been suggested that the non-metalloids were the dominant group and applied the inserts to their unfortunate neighbours as a primitive form of punishment or as a brand of slavery.

The inserts vary in complexity. A few instances are known where one skeleton had a spherical metallic artefact at each of its two major articulations, with others dotted haphazardly around the remaining parts. These secondary artefacts are usually of the small rod type with spiral chasing around the shaft. For convenience these are called "screws". But such rich adornment was rare and is usually only to be found on the older skeletons. The almost universal artefact was a simple, flat, perforated insert, attached to one of the limbs of the skeleton by two, four, six, or eight "screws". In one urban subgroup near the centre of the island such an artefact was so common as to suggest that its insertion was of ritual significance, akin to the ceremonies at the onset of puberty in other extra-terrestrial species. The suggestion has been made by some unorthodox schools that these metallic artefacts might be of therapeutic significance, but a moment's thought will convince the reader of the absurdity of such a suggestion.

* * *

I have just bought my pocket diary for 1962, but this year I am going to take special care in making forward entries and particularly in my use of abbreviations, for I have scarcely recovered from a terrible and expensive experience which occurred two years ago. I had thought to gain favour by remembering my wedding anniversary (which is in November) and when I bought my 1960 diary I immediately made the entry "Wedding Ann" at the appropriate date, forgetting (in fatuous satisfaction at my foresight) even to add the full stop which might have saved me. When after many months the anniversary arrived, I asked my wife which Ann it was whose wedding we were to attend. My wife has red hair. I shall find 50 megaton explosions mere chicken-feed.

* * *

Driving in this morning, I had leisure to observe the car in front of me, and the "sticker" in its back window. A year ago, I think this would have said "Another WHATNOT", but what it says now is "Together we chose a WHATNOT". Looking more closely, I saw what appeared to be a single occupant. Is this schizophrenia on his part, or a negative hallucination on mine?

* * *

Sometimes the effects of laziness plus Aberdonian blood can be extraordinary.

I was stationed out in the wilds, and when I came to post my Christmas cards found I had only 3*d*. stamps. In a mad moment, I cut them all in half diagonally, affixed the triangular half-stamps to the envelopes, and left them to be collected. The next day the post corporal came to me with a long face. "I'm afraid you can't do that, sir. They said you could have got into serious trouble," and I was handed back the offending envelopes.

Gentle reader, what would *you* do? Would you admit defeat and start boiling the kettle ready for steaming? I bought more 3*d*. stamps and cut them diagonally in half, and carefully stuck the triangles beside the ones already in position, reuniting the Sovereign's picture—now surely I must be within the law. And then, to get my 3*d*. worth, I was able to write a letter in each envelope, and seal it down.

* * *

Superintendent engineer (booked for treatment in the E.N.T. ward): "They are going to straighten my turbinals—surely they mean terminals?"

* * *

Just as beneath each sodden plank
The fungus spreads its tendrils rank;
Or as each dried-up disk of dung
Conceals an earwig and its young:
So on this page, each Friday morn,
The Neologue casts forth his spawn.

Letters to the Editor

HALOTHANE

SIR,—In your excellent leading article of Nov. 18 the respiratory depression is emphasised but no mention is made of the increase in rate, which is sometimes so great that intravenous pethidine may be needed. Incidentally, the usual explanation of the tachypnœa (as in the case of trichlorethylene), that the pulmonary stretch receptors are paralysed and that the deflation receptors are simultaneously stimulated, has always seemed to me rather unconvincing.

The most important section in your article, however, is that dealing with halothane anæsthesia given with the vaporiser within the closed circuit and with no assisted respiration. You suggest that if too high a concentration is set on the vaporiser, the respiratory depression so reduces the minute-volume that the rate of uptake of halothane falls below the rate of its escape from the blood-stream into the fat so that overdosage is virtually impossible. If this is so, there must be progressive carbon-dioxide retention which, for reasons given in your article, it may be impossible to detect clinically. Surely this is the exact opposite of modern teaching which not only insists on the prevention of carbon-dioxide build-up but even suggests the desirability of producing a mild alkalosis from hyperventilation. It may be argued that in practice most patients tolerate these conditions without obvious harm; but some do not, as witness the "few accidents" mentioned. Unfortunately there have been a considerable number which have not been reported. If the vaporiser is outside the circuit it might be thought that the concentration of vapour could be accurately calculated; but recent work has shown that if assisted or controlled respiration is used, the variation in pressures on the outlet of the vaporiser may cause considerable fluctuation.

I would therefore suggest that the administration of halothane is a much more complicated affair than might appear. It may be salutary to recall the history of cyclopropane. In 1934 we were presented with a potent but expensive agent which caused respiratory depression. It was given in a closed circuit with about 85% oxygen. The patients' colour remained so good that we sometimes neglected to maintain adequate ventilation and carbon-dioxide elimination. This mistake cost many lives. Do not let us repeat it with halothane.

London, N.6. C. LANGTON HEWER.

SIR,—We were very interested in your leading article of Nov. 18. Working in a hospital group dealing with a large number of bad-risk abdominal emergencies we encounter, from time to time, the syndrome of "neostigmine-resistant curarisation".[1] This condition is nearly always fatal, and, although uncommon, it remains a definite hazard in dehydrated patients with electrolyte imbalance—a common condition in many abdominal emergencies. The most satisfactory approach seems to be to dispense with relaxants.

We have found halothane and oxygen an excellent anæsthetic for such cases. Initially we used this combination with the patient breathing spontaneously (vaporiser outside circuit). Muscle relaxation was not always as good as that obtained with relaxants and there was the added danger of CO_2 accumulation, although we noted no clinical signs of this.

Now that we have a 'Fluotec' (10%) vaporiser we are using a technique identical with that of Johnstone [2] and are controlling respiration after inducing deep halothane anæsthesia. This technique gives operating conditions virtually comparable with those obtained by muscle relaxants. It may well be the method of choice for poor-risk abdominal emergencies. Where vomiting or regurgitation are anticipated, a rapid and safe inhalational induction can be achieved with the patient in the head-down position.

We feel that halothane is useful in combating and preventing shock, and moreover the postoperative state of our patients has been conspicuously good.

Muscle relaxants in full paralysing doses plus controlled respiration with nitrous oxide and oxygen have provided safe and satisfactory operating conditions now for many thousands of cases. We feel that the benefits of muscle relaxants should not blind us to certain contraindications to their use.

T. D. W. DAVIES
C. D. T. JAMES
A. D. PIATKUS.

Camberwell Group of Hospitals, London, S.E.22.

1. Hunter, A. R. *Brit. med. J.* 1956, ii, 919.

DIFFUSION OF PROPICILLIN

SIR,—Williamson et al.[3] have described the general pharmacological properties of propicillin (PA-248). We should like to report a limited investigation into its diffusion across the placenta and from the blood-stream into the cerebrospinal fluid.

The antibiotic was given by mouth to seven women on admission to hospital for delivery. Except for patient 4 (see table) who had mild toxæmia of pregnancy, only healthy mothers who had had normal pregnancies were included. The dose was 250 mg. every four hours from admission until delivery. For patient 6 the second and final dose was 500 mg.

Blood samples were taken within a few minutes of delivery from the intercubital vein of the mother and the umbilical vein of the infant. Concentrations of propicillin in the sera were determined by the standard dilution method by reference to the antibacterial activity of penicillin G, using *Staphylococcus aureus*, Oxford H strain, N.C.T.C. 6571 as test organism.

RESULTS

Patient	No. of doses	Dose-delivery interval (min.)	Total dose (mg.)	Concentration in maternal serum (μg per ml.)	Concentration in infant serum (μg per ml.)
1	2	183	500	0·6	<0·03
2	2	115	500	5·0	0·6
3	1	35	250	1·25	<0·03
4	1	170	250	0·15	<0·03
5	4	310	1000	0·6	0·3
6	2	300	750	0·25	0·06
7	4	250	1000	0·06	0·06

The table shows that the concentration of propicillin was lower in the infant's serum than in the mother's. The infant/mother ratio was highest for patients 5 and 7, who had received the biggest dose (1000 mg.), and lowest for patients 1, 3, and 4 who had received only 500, 250, and 250 mg. In patients 5 and 7, however, the interval between the last dose and delivery exceeded four hours, and low concentrations in the mother's serum were to be expected. Probably it is the low concentration in the mother's serum rather than a high concentration in the cord serum that is responsible for the high ratio and for the apparently greater diffusion.

In patients 2 and 3 blood was taken at times when concentrations in the mother's blood were likely to be highest; and they were 5 μg. and 1·25 μg. per ml. In their infants the corresponding concentrations were 0·6 μg. and less than 0·03 μg. per ml.

It appears, therefore, that the concentration of the drug in the infant's serum depends not only on the concentration in the mother's serum but also on the duration of

2. Johnstone, M. *Brit. J. Anæsth.* 1961, 33, 29.
3. Williamson, G. M., Morrison, J. K., Stevens, K. J. *Lancet*, 1961, i, 847.

administration and the total dose. If propicillin is given to the mother so as to protect the infant against infection, a dose of 500 mg. every four hours is likely to be adequate.

In two children suffering from recurrent epileptic attacks, on account of which planned lumbar punctures were performed for purposes of diagnosis, concentrations of propicillin in the cerebrospinal fluid (C.S.F.) were estimated after oral administration of the antibiotic. In neither child was any abnormality shown by examination of the nervous system or C.S.F.

In one child of 3, who received four oral doses of 250 mg., the concentration in the C.S.F. was less than 0·6 μg. per ml. In the second child, aged 5, concentration was less than 0·03 μg. per ml., after two doses of 250 mg. Blood concentrations were measured in one of these children and found to be 32 μg. per ml. at thirty minutes, 8 μg. at sixty minutes, and 0·25 μg. at four hours after the first dose.

These results indicate that the diffusion of propicillin into the C.S.F. is, like that of penicillin G, very small when the meninges are normal and not inflamed.

We wish to thank Messrs. Pfizer Ltd. for providing supplies of PA-248 ('Ultrapen').

Children's Department, Farnborough Hospital, Kent.

C. K. RAO
P. N. SWIFT.

DISC LESIONS AND SYNDROMES

SIR,—Dr. Dalgleish's letter of Nov. 11 emphasises again the need to evaluate the significance of the "osteopathic spinal lesion". He rightly points out that the intervertebral joint does not merely consist of a disc, but that the disc is just part of the whole intervertebral structure. It is refreshing to read that there is such a thing as an "intervertebral joint complex dysfunction", because the osteopathic profession have been trying to describe, trying to define, trying to produce evidence of, and certainly trying to treat this entity. That it exists there is no possible shadow of doubt, that it is elusive and, therefore, difficult to demonstrate and easy to disparage, is also patently obvious. What is needed is further elucidation of its features and its local and remote effects.

Dr. Dalgleish's hypothesis does not really bring us any nearer the solution but it is a very reasonable one. The idea that the spinal lesion is a predisposition to disc degeneration is an osteopathic one and I elaborated the theory in my own *Manual of Osteopathic Technique* in 1959, but what is needed is some keen research-worker or team of workers to find out and prove what takes place in spinal-joint lesions and what takes place when such joints are manipulated.

It is the purpose of the newly-formed Osteopathic Medical Association to collate all the evidence and initiate further research on this fascinating subject. As osteopaths we think we know how to diagnose the osteopathic lesion and we certainly have effective methods of treatment, but the theoretical and experimental evidence is sadly lacking.

London, N.W.1. ALAN STODDARD.

SIR,—Dr. Dalgleish stresses the importance of structures other than the intervertebral disc in spinal movement. The latter two-thirds of his letter would serve very well as a précis of the lectures on this subject given at this school on the osteopathic spinal lesion, and its applied anatomy and physiology.

The student is trained to diagnose lesions of the various components of the intervertebral joint complex (I.V.J.C.), and in corrective manipulation based on this diagnosis, in the treatment of patients with these syndromes. The mechanical concept of the osteopathic spinal lesion as a fixation of the joint at some point within its normal range of movement is only a part of the concept of the lesion complex. It is the most important part, since it is available both for diagnosis and for the application of specific manipulative techniques for its correction. The local and remote effects of the lesion complex, in pain syndromes and visceral disturbance, are really the basic hypothesis of osteopathic practice. Perhaps it is not too much to hope that, now it has been described so comprehensively by a medical man, the I.V.J.C. may receive more attention in medical circles than it has in the past.

May I offer a further hypothesis about one cause of disc degeneration, avoiding the controversial point, raised many times in these columns, as to whether or not the disc can suffer vascular changes? Disc nutrition is influenced by intervertebral joint mobility and its "pumping" effect on the disc through the epiphyseal plate. Thus, when the joint becomes fixed, this mechanism is lost, and the disc suffers degeneration as a result. May it not be that many disc degenerations, local rather than general, begin as a joint fixation with subsequent degeneration and/or prolapse?

British School of Osteopathy, London, S.W.1. S. WEBSTER-JONES
Principal.

HEATING—VENTILATING—COOLING

SIR,—I should like to congratulate Professor Wells (Nov. 4) on his comprehensive impressions of the theatre-ventilation sessions at the recent international conference. May I as an engineer, however, make the following necessarily brief observations:

(1) Ceiling heating is not necessarily too costly for ward use; it has been extensively used in Northern Ireland and has been approved for at least one new major hospital in England.

(2) The downward piston effect is far from accepted practice throughout this country. There is much evidence, including Medical Research Council tests, to indicate that the very low velocities involved (3·0 feet per min.) cannot be maintained under practical conditions. These low speeds can cause considerable discomfort to staff, apart from possibly failing to remove high concentrations of bacteria around the table. These two objections can be overcome by the use of a stream of air from high-level wall inlets aimed at "scouring" the table area and providing comfort conditions but with a terminal velocity strictly limited to 50–60 feet per min.

(3) The provision of a flap or filter at points of discharge into theatre suites is interesting. The only danger between main filter and discharge point is of some small degree of air circulation, when the plant is not operating, with deposition of dust particles. The extent of this risk requires investigation. It would be possible to prevent this occurring by keeping the plant in operation but this would be extremely costly, and reduced air quantities would not be a complete solution. Flaps or filters are possibilities if the risk is found to be serious and if it cannot satisfactorily be overcome by operating the plant for an hour before a list is started.

(4) It is in practice difficult to maintain a higher differential pressure than 0·10 in. water gauge in an operating-theatre suite because of whistling at doors, difficulty in closure, &c. Even at this pressure there is evidence that on opening doors, inward air movement can take place over limited sections of the door area. No system of linking closure of flaps to door operation will overcome this effect.

(5) It would certainly assist engineers if the use of explosive anæsthetics were to cease; there would be an economy in new construction and comfortable conditions could more easily be achieved. This presumably could only be done with the unanimous agreement of the medical profession. Even if the use of ether and cyclopropane could be discontinued, is there not a possibility of a new anæsthetic being discovered with improved qualities but, alas, explosive?

(6) Package air-conditioning plant does not unfortunately offer any saving in cost, since it has to be sized in accordance with the design load and full standard filters added. There is, of course, a saving in physical space.

(7) The admission of cooled air interferes with the piston

effect, as Professor Wells stated, and this is a further argument against the use of this particular system. It is not however correct that the adoption of recirculation reduces the *total* amount of air; it reduces the amount of fresh air but the number of changes remains constant.

(8) Recirculation of used cool air therefore appears at first sight to offer considerable economies in the provision and operation of cooling plant. Investigation reveals, however, that this is not the case. Let the following typical conditions be assumed for a twin theatre suite:

External temperature: 82°F dry bulb (D.B.), 66°F wet bulb (W.B.), 43% relative humidity.
Theatre temperature: 70°F D.B., 61°F W.B., 60% R.H.
Air temperature leaving cooling battery: 52°F D.B.
Air temperature at entry to theatre: 54°F D.B.

Percentage recirculation	*Air temp. at entry to cooler* (°F)	*Cooling required* (°F)	*Apparent saving on cooling capacity*	*Actual saving in cooling capacity*
Nil	82	30	0	0
50%	76	24	20%	18·5%
75%	73	21	30%	37%

50% recirculation.—With a reduction in cooling load of 18·5% there would be savings in capital cost of cooling plant of £300 and annual running cost of £10. Against this, however, must be set the additional fan, filter ducting, automatic dampers, &c., at a capital cost of £1700.

75% recirculation.—With a reduction in cooling load of 37% the savings on cooling plant are: capital £570, annual running £20. The cost of additional mechanical equipment in this case rises to £2250.

These figures are necessarily approximate but it is clear that recirculation is more expensive in initial capital cost and that this is not offset by the reduced running charges.

In addition the necessary fan extraction from the suite involves the risk of loss of pressurisation when doors are opened unless complicated linking dampers are installed. The risks arising from recirculation of infected air are very considerable, and few engineers would be prepared to guarantee that filtration would always be 100% efficient in view of such difficulties as maintenance.

(9) Two other disadvantages of recirculation are the extra space and servicing required for the additional plant and ducts and the fact that neither anæsthetic gases or odours are removed by normal filters. The use of activated carbon to do this would greatly increase fan power and filter cost.

Birmingham Regional Hospital Board,
Edgbaston, Birmingham. JOHN CONSTABLE.

PLATELET ECONOMY DURING MODERATE AND INTENSIVE DICOUMAROL THERAPY

SIR,—Dr. Murphy and Dr. Mustard (Oct. 28) suggest that low doses of dicoumarol increase the tendency of the blood to clot, compared with the blood findings in untreated patients. In their table I, apart from expected changes in prothrombin-time and plasma-thromboplastin-time, the only significant change is a fall in platelet-count. It has not been established that this represents an increase in blood coagulability. In table II none of the tests show a significantly increased clotting tendency. As there was no significant difference in the mean values one cannot assume a change. The statement that low doses "produce an average change in the direction of increased coagulability" then is unjustified.

If statistical methods are introduced, the results must not be disregarded. The authors have disregarded the results calculated for platelet turnover "gaussian". Having stated that platelet turnover was computed in two ways as there was "no clear indication as to which is correct", they ignored a significant difference in platelet turnover "gaussian" which suggested that low doses of dicoumarol decreased rather than increased coagulability.

Our study has been mentioned as an example of the danger of under-treatment. In our series there was no significant difference in mortality between the treated and control groups, which does not support their contention. Furthermore we disagree with the statement: "It is a commonplace clinical observation that abrupt cessation of therapy is fraught with danger." The question of whether or not a rebound increase in clotting occurs on stopping dicoumarol is still unsettled. Many workers have an impression that it does occur and they taper off dicoumarol treatment over a period of several weeks. If the authors' concept of a lower danger zone is correct this practice would be much worse than abrupt cessation.

The logic of the following statement eludes us: "That a powerful pharmacological agent like dicoumarol should have been under clinical study for some 20 years without unassailable conclusions being drawn about its efficacy is itself reason for wondering whether low dosage may be harmful." Is it not more probable that the continued uncertainty reflects the limited benefit of anticoagulant therapy in any dosage?

Toronto General Hospital,
Toronto, Ontario. K. W. G. BROWN
R. L. MACMILLAN.

A CASUALTY TROLLEY

SIR,—The casualty trolley described by Dr. Fulford (Nov. 11) incorporates several features which make it valuable in a busy casualty service. It is surprising, however, that an oxygen-operated sucker seems to have been omitted. Such a device would avoid both the size and weight of separate portable suckers which are often used. The addition of a foot-operated gas-control on such a sucker in situ would totally free an extra pair of hands, which is very useful when a number of severely injured patients are being admitted.

Radcliffe Infirmary,
Oxford. NIGEL G. L. HARDING.

"IATROGENIC"

SIR,—If I have delayed my reply to those who doubt my interpretation of "iatrogenic" it is because I have been kept busy by what I am told should be called pathogenous bacteria.

I am not going to quibble about Dr. Sakkas' objection (Nov. 4) but I must remind him that Aristotle used γεννάω of the female parent as well as of the male (Gen. An. 3.5,6). The crux of the argument is whether γένος in compound words should be used actively or passively: does iatrogenic mean "giving rise to doctors" or "caused by doctors"? I spent an evening with Liddell and Scott's Lexicon on my knees and my conclusion was that both usages occur in Classical Greek (and both are rare) but that the active use is the commoner. In English (and this is the language in question) the weight of custom favours an active use—e.g., hydrogen, androgen, pathogenic, thermogenic. I would not wish to be dogmatic about this. To us, pyrogenic means "causing fever": to a geologist it means "caused by fire". The other obvious exception is psychogenic—and that does not appear in the *O.E.D.*, whence come my other examples. I can find no justification for the distinction between iatrogenic and iatrogenous. Pathogenous and pathogenic mean the same, while thermogenous is used both actively and passively.

The French are usually more accurate in their use of language than we are. *Thermogène* and *pyrogène* support active usage but *pyrogéné* is used passively (=*produit par l'action du feu*).

My general conclusion is that while these compounds founded on γένος may be used actively or passively the former is more usual. Few of them occur in Classical Greek, and the only excuse for a neologism is that it supplies a more precise meaning than its equivalent in the vernacular. "Iatrogenic" is condemned by the very fact that it can bear two meanings both open to reasonable doubt. Professor Vash (Nov. 11) argues for the elegance of nephrectomy. I am not averse to elegance in language but I value lucidity higher.

Hoccombe,
Somerset. J. A. BOYCOTT.

EPIDEMIOLOGY OF COMMON COLDS

SIR,—Your leading article of Nov. 11 summarises well the difficulties that face investigators; and it clearly indicates the lines which future work should follow. I do think, however, that it gives an all-too-embracing role to the viruses associated with the common cold. Many people believe that the cold viruses, per se, are harmless, and rarely cause illness sufficient to keep a victim away from work. Dr. Morrison Ritchie [1] puts this point clearly:

"As a result of these and other findings, the opinion was formed that the common cold might be due to two factors—the virus, whose function is essentially depressive, and an invasion by the patient's own normal but heterogeneous secondary organisms, which are usually present in a state of equilibrium, overstepping the mark only as a result of the patient's depressed resistance caused by the virus. If this explanation was correct, these volunteers, experiencing the prodromal stage for a day or two, still kept on taking their colds as far as the virus was concerned, but were immunised against the effects of their own organisms. If patients could be protected against these. the virus could do its worst, causing only slight nasal inconvenience."

The convincing results he obtained by his investigations have never been adequately followed up. They should be. Such follow-ups as have been published did not precisely carry out the recommended technique. Thus, their adverse conclusions were of no value.

Chipping Campden, Gloucestershire. C. B. HEALD.

PRISON DOCTORS

SIR,—The isolation of the Prison Medical Service, to which you drew attention in a leading article (Oct. 7) seems to be underlined by a shocking incident that has taken place at Dartmoor Prison. The prisoner was found dead in a *padded* cell in a *strait* jacket.

Although his death was not thought to have been hastened by this treatment, it is disturbing to know that padded cells and strait jackets are still looked on as treatment. I know of no British mental hospital, however backward, that has used these instruments of torture during the past quarter-century, although, unfortunately, they are still used in many hospitals in North America. I spent two years abolishing them in a Canadian hospital: this led to a marked drop in tension amongst patients and staff, and the reduction of violent outbursts was quite dramatic.

I hope that more influential readers of your journal than myself will investigate the prescribing of padded cells and strait jackets in our prisons. That the use of padded cells and strait jackets is still even possible can only be excused on grounds of ignorance. I would therefore like to support your plea that all prison medical officers should have a thorough training in modern psychiatric methods; and, as you rightly point out, short courses for prison doctors at the Institute of Criminology, or even for that matter at the Institute of Psychiatry, are not enough. The techniques and skills that have been learnt by psychiatrists and psychiatric nurses in the mental hospitals over the past 10 years in reducing violence to negligible proportions can, I am convinced, be applied, with some modifications, to prisons. As you rightly remark, prisons can be turned into therapeutic communities, but they cannot and will not become therapeutic communities until prison medical officers, and to some extent prison officers, have had an opportunity of seeing how the modern psychiatric hospital deals with behaviour problems. It will no doubt be many years before this can come about, but at least a start could be made by fortifying the links between local prisons and the local mental hospitals.

Hard pressed as the psychiatric services are, I think that local mental hospitals could spare a consultant for one afternoon a week, not necessarily to treat prisoners but to advise the governor and prison medical officer, who, indeed, through no fault of his own is not aware of the newer and more effective methods of diminishing violence; and, apart from giving specific help on specific problems, I am quite certain that the mere get-together of these people would in time be of immense benefit to all concerned.

Violence in a prison or a hospital is a barometer not of the original sin of the prisoners but of the morale and basic attitudes of the staff. It is obvious that much needs to be done and it will be many years before prisons can really become therapeutic communities, but a start should be made and that start could well be the absolute prohibition of the use of strait jackets and padded cells.

Towers Hospital, Humberstone, Leicester. H. B. KIDD.

1. *Lancet*, 1958, i, 615.

THE VACUUM EXTRACTOR

SIR,—I read Dr. Huntingford's article (Nov. 11) with great interest because I have lately been anxious to know how effective the vacuum extractor would be in the nullipara without disproportion, in whom the delay was for the most part due to a rigid cervix, slow to dilate because of incoordinate uterine action, whether because of fear, malrotation of the head, or a combination of both. His results would certainly make one think twice before using this instrument in this particular type of case, and he is to be congratulated on his contribution to this problem.

The general opinion seems to be that cæsarean section is the only alternative. I suggest that there is another method of treatment worth serious consideration—one I would use myself almost exclusively in the young primipara, provided the cervix was three or more fingers dilated and well taken up. And that is, under general anæsthesia, to manually dilate the cervix. In most cases where the cervix is over half dilated this manœuvre is usually sufficient to allow the application of the forceps and delivery. If this is not sufficient, however, the cervix may be incised. The critics of this operation say that it is impossible to control extension of the incision into the lower segment of the uterus: in fact, this is no more difficult to control than is extension of the incision in the lower-segment cæsarean operation. Any malrotation should then be corrected by Kielland's forceps. When the delivery is completed the cervix should be drawn down to the vulva by ovum forceps and the incisions or tears repaired. Of course, this operation should be carried out only in the operating-theatre with the same preparation as for cæsarean operation. I have, within the past three months delivered 4 patients by this method with excellent results for mother and baby.

It is so easy nowadays to solve all our obstetric problems by section that we are inclined to forget former excellent manœuvres. The patient who is a likely candidate for this condition is often recognisable before or early in labour: they get venous spasm when blood is to be taken, and they are mentally tense (rigid mind, rigid veins, rigid cervix).

Galway, Eire, D. T. O'DRISCOLL.

STERILISATION INDICATORS AND HIGH-PREVACUUM STERILISERS

SIR,—Reports have been received at this laboratory that Browne's indicator tubes type II have failed to change satisfactorily when subjected to a high-temperature high-prevacuum sterilisation cycle. Those reporting have assumed that this sterilisation process is infallible and that, therefore, it must be the tubes that are at fault. Neither assumption is justified.

The correct prevacuum may not be achieved because of a failure in the pumping system or an inward leak of air. Combined pressure and vacuum gauges of the Bourdon type, which are commonly supplied, cannot be expected to indicate the degree of prevacuum achieved with sufficient accuracy. Only

an absolute-pressure gauge or a mercury manometer can be relied on for this purpose. Even if the prevacuum is adequate, leaks can allow sufficient air to be readmitted between the prevacuum and steaming stages to prevent rapid penetration of the load.[1] The manufacturers of sterilisers are aware of these difficulties: they and others are known to be actively seeking technical ways to overcome them.

I have personally investigated the analytical control of Browne's tubes and I am satisfied that, if correctly stored and used, they are a reliable guide to efficient sterilisation. (This was also the opinion of the Medical Research Council working party on pressure-steam sterilisers [2]). A failure to change a type-II tube by a high-temperature high-prevacuum steriliser should never be ignored but should be the signal for a critical appraisal of the steriliser and of the way it is being used with, if necessary, assistance by the manufacturer.

Disinfection Reference Laboratory,
Central Public Health Laboratory,
London, N.W.9. J. C. KELSEY.

THE INDUSTRY IT DESERVES?

SIR,—Dr. Schmeidler (Nov. 11) asserts that "there often elapses a long period of time before the drug is officially given a generic name". Assuming that he writes from the viewpoint of practice in this country, "occasionally some time" would be more accurate than "often a long period".

Most drugs are introduced into this country from overseas, and even if the British Pharmacopœia Commission has not officially recognised a generic name when a drug is first marketed here, either a W.H.O. non-proprietary name or an American N.N.D. name is usually available to any manufacturer who really wishes to convey the information. The example quoted by Dr. Schmeidler draws our attention to the "anti-inflammatory" steroids, a series of compounds which illustrate the point nicely. Incidentally, I believe that his example has been known as prednisone (or Δ′ cortisone) since its introduction into British medicine. In support of Dr. Laurence, we might quote another example from the same series. Most doctors prescribe 9α-fluoro- 11β, 17α, 21— trihydroxy- 16α-methylpregna-1, 4-diene-3,20-dione as dexamethasone (originally an American N.N.D. name and available long before the drug's introduction here), realising that to use any of the names 'Decadron', 'Dexacortisyl', 'Millicorten', 'Dextelan', or 'Oradexon' would be to make a rod of confusion for their own backs. The only example to date of a compound of this type not being introduced from abroad had an approved name from the first—betamethasone.

It seems to me that Dr. Schmeidler's point (while valid in a few cases if amended as I have suggested) is used by some manufacturers as an excuse for withholding information, and to give their proprietary name an exaggerated importance.

Selly Oak Hospital,
Birmingham. A. P. LAUNCHBURY
Deputy Chief Pharmacist.

HALVING THE DRUG BILL

SIR,—Tony and John are identical twins, born in 1956, and bed-wetters. They are invariably dry or wet, as the case may be, on the same night, though they sleep in separate beds. They are never out of step. Last year, they both were given some tablets for the enuresis, and both improved for a while—still in step. A month ago, John was started on amphetamine, 2·5 mg. at bedtime. Tony has no pills. Now they *both* are dry much more often than before—still invariably in step.

Waroona,
Western Australia. PAUL MESTITZ.

1. Fallon, R. J. *J. clin. Path.* 1961, **14**, 505.
2. *Lancet*, 1959, i, 425.

URINARY EXCRETION OF UROCANIC ACID IN MEGALOBLASTIC ANÆMIA

SIR,—Dr. Knowles (Nov. 18) finds that "under controlled experimental conditions the excretion of formiminoglutamic acid after a histidine load can be significantly increased in folic-acid-deficient patients but not in normals". The following figures show the excretion in the urine of formiminoglutamic acid in 4 medical students given increasing oral doses of histidine:

Histidine (*g.*)	*Urinary formiminoglutamic acid* (*mg. in 8 hours*)			
5	1	<1	1	<1
10	3	6	4	4
15	9	8	8	5

Increased amounts of histidine derivatives appear in the urine with regularity after adequate histidine loading both in normal subjects and in many disease states. These results emphasise that in carrying out critical studies a sensitive and quantitative method for estimating histidine derivatives is essential. Methods that depend on ninhydrin staining may prove useful in the clinical laboratory but give too many false negative results to be reliable as a research tool.

We have now studied a number of patients with megaloblastic anæmia in whom only urocanic acid was excreted after histidine loading. The clinical value of these observations is self-evident.

M.R.C. Experimental Hæmatology
Research Unit,
St. Mary's Hospital Medical School,
London, W.2. MYRA C. BENNETT
I. CHANARIN.

LATEST THOUGHTS ON THE CARDIA

SIR,—Referring to your leader of Oct. 7, I would like to record my investigations of the closing mechanism of the cardia.

The measurements given below were made in anæsthetised dogs, and all figures are averages of several measurements in mm. Hg. In the first series of experiments the "yield pressure" (Y.P.) of the cardia to the passage of fluids, in both directions, was determined, by progressive filling of the stomach and œsophagus, and was recorded at the moment of reflux:

Dog	*Œsophagus-stomach*	*Stomach-œsophagus*	*Remarks*
1	10	10	Thoraco-laparotomy
2	13	13	Diaphragm intact
3a	10	10	Abdomen and thorax open
3b	10	10	Same animal with thorax open and spontaneous respiration

These results show the Y.P. of the cardia to be the same in both directions.

If, as manometric experiments indicate, the cardiac sphincter is situated in the intra-abdominal part of the œsophagus, it is possible that the closing of the cardia will be affected by the intra-abdominal pressure, and that when this is raised a higher intragastric pressure will be required if reflux is to occur. It was decided to investigate the possibility that reflux will only occur when the intragastric pressure exceeds the Y.P. of the cardia by an amount equal to the intra-abdominal pressure; in other words that the Y.P. of the cardia can be calculated as the difference between the intragastric and intra-abdominal pressure at the moment of reflux.

To test this hypothesis 4 dogs were anæsthetised, and intragastric (I.G.P.) and intra-abdominal pressures (I.A.P.) were measured during progressive filling of the stomach until reflux occurred. These experiments were performed with closed and widely opened abdomen. Again all figures are averages of several measurements in mm. Hg:

	Abdomen closed			*Abdomen open*		
Dog	*I.G.P.*	*I.A.P.*	*Y.P.*	*I.G.P.*	*I.A.P.*	*Y.P.*
1	36	18	18	18	0	18
2	34	15	19	19	0	19
3	19	10	9	10	0	10
4	17	5	12	8	0	8

These results seem to demonstrate the validity of the hypothesis.

When the cardia is situated in the thorax, as with a sliding hernia, it will no longer be subject to intra-abdominal pressure. It was decided to investigate the effect of the "negative"

intrathoracic pressure in such cases; a partial thoracic stomach was produced in dog 1 from the second series, and, after a lapse of several weeks, the experiment was repeated:

Abdomen closed		*Abdomen open*	
I.G.P.	*I.A.P.*	*I.G.P.*	*I.A.P.*
8	5	9	0

This experiment shows that reflux was produced at approximately the same intragastric pressure with closed and open abdomen. The Y.P. of the cardia must now be calculated as the difference between the intragastric and intrathoracic pressure at the moment of reflux. Assuming the latter, during quiet respiration, to be of the order of 10 mm. Hg, the Y.P. will be $8-(-10)=18$ mm. Hg—i.e., the same as for the same dog in the second series of experiments.

I think these findings support the views of Creamer et al., and are strong evidence in favour of the existence of a functional cardiac sphincter.

Section of Experimental Surgery,
Department of General Surgery,
University of Utrecht,
Holland.

J. H. MEISS.

LATE APPEARANCE OF LEG SYMPTOMS IN PULMONARY EMBOLUS

SIR,—I think the test mentioned by Dr. Churcher (Nov. 11) is liable to give false impressions.

Many elderly people have a distinct aversion to having " the fingers pressed very firmly into each belly of the gastrocnemius . . ." On the other hand, palpation between the two heads of the muscle over the popliteal vein at the lower end of the popliteal fossa elicits tenderness even in cases where the calf muscles are painless to pressure. This form of palpation is not resented, a very important point.

Being pulmonary-embolus minded, for many years I have habitually examined the legs of all elderly chest patients and other suitable cases, and I can confirm that embolism is common.

Just occasionally it may be very difficult to distinguish an embolus from a small cardiac infarct; but serial E.C.G.s, in conjunction with the serum transaminase, lactic dehydrogenase, and bilirubin, resolves most problems. To be pulmonary-embolus minded is the greatest help of all.

Barnet, Herts. G. RIDDELL ROYSTON.

ULTRASONICS AS AN AID TO DIAGNOSIS

SIR,—Your leading article of Oct. 28 comes as a welcome sign to one who has laboured for over eight years to interest other radiologists in the possibilities of ultrasound both diagnostic and surgical.

Though I read a paper on the uses in neurology and neurosurgery at the Symposium Neuroradiologicum of 1955, and this year read a paper to the Ophthalmological Society of the United Kingdom on the diagnostic use in the eye and orbit, interest has been aroused among clinicians much more than among radiologists.

The work of Douglass Howry, of Boulder, Colorado, goes back twenty years, and it is only recently that he has begun to be recognised as the great pioneer he is. In association with J. H. Holmes, of Denver, using a technique of multiple scans very similar to that of Donald, he has extended the diagnostic use of ultrasound to the liver, spleen, kidney, neck, and limbs. It is astonishing that his demonstration of metastatic deposits in the liver has not been hailed as epoch-making.

I have organised two discussion groups on the medical uses of ultrasound: the first, on the destructive uses in Ménière's disease and in neurosurgery, has had two meetings; and the other, on the diagnostic uses, had its first meeting on Nov. 23 at the Royal Society of Medicine.

Those wishing to receive the summary of the proceedings of either group are asked to let me know.

West End Hospital for Neurology
and Neurosurgery,
91, Dean Street, London, W.1. DOUGLAS GORDON.

ANTINUCLEAR FACTORS AND SYSTEMIC LUPUS ERYTHEMATOSUS

SIR,—In their letter of Sept. 9, Dr. Ansell and her colleagues reported that they had found antinuclear factors in the serum of only 4 of 81 first-degree relatives of patients with classical systemic lupus erythematosus, and this incidence is considerably less than that reported by us last year.[1] Since our preliminary communication was published, full details of the method we used have been given,[2] and our studies have also been considerably extended.

The method which we use differs from that of Dr. Ansell and her colleagues in the following respects:

(1) Fresh, unfixed human buccal mucosal-cell smears were used as the source of the cell nuclei, rather than alcohol-fixed frozen sections of fœtal thyroid tissue.

(2) Serial dilutions of serum were used in the test on every serum, rather than a single 1 in 10 dilution of serum.

We have not worked with fœtal thyroid tissue, but early in our studies on the antinuclear factors, we found that frozen *unfixed* sections of rat kidney tissue were a less sensitive source of cell nuclei than were unfixed human buccal mucosal cells.[2] In fact, we tested 97 sera on both rat kidney tissue and human buccal mucosal cells. We found that the tests on 32 sera were positive and on 38 sera were negative with both tissues. However, 26 sera were positive with buccal mucosal cells and negative with rat kidney, whereas the reverse occurred in only 1 instance.[2] Also, we showed that when serial dilutions of sera were compared, higher titres were found with buccal mucosal cells on 14 sera, whereas a higher titre was observed only once with rat kidney tissue. For these reasons, we elected to use human buccal mucosal cells as the test tissue in our future experiments. Clearly, in order to compare Dr. Ansell's results with our own, it will be necessary to compare the same sera in both test systems.

We have also given our reasons [2] for accepting as a positive test specific nuclear fluorescence with serum diluted 1 in 4. In the past year our studies on control subjects, as well as on patients with S.L.E., have been extended, and we believe that our data justify the assumption that a positive test is one in which nuclear fluorescence is obtained with serum diluted 1 in 4. The following data summarise our observations to date on healthy subjects, patients with diseases unrelated to S.L.E. and other collagen diseases, and on relatives:

	No. of tests	*Serum diluted 1:4*		*Serum diluted 1:8*	
		Positive	*Negative*	*Positive*	*Negative*
Healthy subjects	63	1	62	0	63
Patients with disorders " unrelated to S.L.E." . .	195	8	187	6	189
Patients with S.L.E. (total no. of sera)	325	298	27	286	39
Relatives:					
First-degree relatives of S.L.E. patients . .	109	47	62	32	77
Second-degree relatives of S.L.E. patients . .	45	10	35	5	40
Relatives of healthy propositi matched for age, sex, and race with S.L.E. patients . .	23	0	23	0	23

These figures justify our earlier conclusion [1] that antinuclear factors do in fact occur frequently in first-degree relatives of patients with S.L.E. If 1 in 4 is taken as the critical level, then 47 of 109 first-degree relatives had positive tests. If we re-examine our data in terms of a serum dilution of 1 in 8—thus approximating the dilution used by Dr. Ansell and her colleagues—then we still conclude that 32 of 109 first-degree relatives had a positive test for antinuclear factors.

In addition, we find it difficult to accept that the incidence of antinuclear factors in relatives can be as low as that found by Dr. Ansell and her colleagues because, in the course of our studies, we have already encountered 3

1. Pollak, V. E., Mandema, E., Kark, R. M. *Lancet*, 1960, ii, 1061.
2. Mandema, E., Pollak, V. E., Kark, R. M., Rezaian, J. *J. Lab. clin. Med.* 1961, **58**, 337.

relatives who, on clinical grounds, have definite S.L.E.[3]; and there is increasing evidence that the disease S.L.E. is in fact more common in family members than had previously been thought.[4]

The studies reported here have been supported by grants from the United States Public Health Service.

VICTOR E. POLLAK
ENNO MANDEMA
ROBERT M. KARK.

University of Illinois College of Medicine, Chicago.

MYOCARDIAL INFARCTION DURING PREGNANCY AND PUERPERIUM

SIR,—I was very interested in the article by Dr. Watson and his colleagues.[5]

May I comment on case 2? The electrocardiogram, which is the cornerstone of the diagnosis, I would interpret somewhat differently. In lead III a small R is visible, the inverted Ts in leads III and aVF are definitely not symmetrical, and the left shoulder is "soft". Similar tracings are not uncommon with a strong left-axis deviation. Were the tracings taken during maximal inspiration? This simple manœuvre may sometimes help. I wonder what the further history of this patient has been.

Hasharon Hospital, Petah-Tiqvah, Israel.

J. SHAPIRA.

NIGHT-CALL SERVICES

SIR,—Past experience of the Government's attitude to medical remuneration should disabuse "Postgraduate" (Nov. 11) of any hope that for the National Health Service to take over the night-call services would relieve him and others of their financial difficulties.

The proper remedy is for the Ministry of Health to provide adequate grants for postgraduate training. The day has gone when the most industrious junior in a peripheral hospital can save enough to live, perhaps for months, in London while he attends courses for higher examinations. The nationalised industries advertise grants and scholarships, and the Armed Services give study leave to aspirant specialists.

We shall be desperately short of specialists in another few years, and the Ministry has yet time to bring its thinking up to date and prevent part of the approaching staff crisis.

Eye, Ear and Throat Hospital, Murivance, Shrewsbury.

E. N. OWEN.

DOCTORS FOR THE FORCES

SIR,—Flight-Lieutenant Venn's letter (Nov. 11) illustrates the factitious argument. I can practise neurology, just as the expert in public health can apply the principles he has learnt, in a wide variety of environments. I am doubtful if any large number of doctors choose a Service career in order especially to practise their art in field, tank, ship, or aeroplane. More general factors common to all Service life are likely to be important. In any case it seems unwise to plan the disposal of medical manpower, a valuable and apparently increasingly scarce national asset, on such a basis. But discussion is profitless since we shall undoubtedly have a combined Service if we survive the onset of another world war. It might be more sensible to discuss ways of initiating such a Service now, while consideration and planning are possible, rather than to wait and have it thrust upon us as an ill-organised emergency measure. In either context dovetailing of civil and military needs, here and abroad, will be of paramount importance. Perhaps this too may be an arid exercise in view of the probable nature of a further war.

Oxford. C. W. M. WHITTY.

PSYCHIATRIC REHABILITATION ASSOCIATION

SIR,—At a recent symposium at the Institute of Psychiatry the future of the mental hospitals was discussed. The facts and figures about the fate of psychiatric patients given by Dr. John Wing made it plain that the future depended less on bricks and mortar for new units than on the provision of services for care and rehabilitation in the community. This had been recognised by the Royal Commission on Mental Health and the statutory obligation has been placed on the local authorities under the Mental Health Act of 1959.

Your readers may be interested to learn of a psychiatric rehabilitation association in East London established with the generous help of the London County Council and supported by the management committee of the hospital concerned with the psychiatric care of patients from this area. This Association is formed by the patients in and outside the hospital, and their relatives and friends, and is aided by the staff and the social workers in the community. Its aim is to prepare patients (and their families) for their return home, and help them with their adjustment to home, employment, and society, and thus help the local authority in the discharge of their statutary obligation.

The size of the problem confirms the need for action: 1400 patients are admitted annually from East London to Long Grove Hospital, 25 miles away; 95% of them have left the hospital within six months, but only 70% are able to return to their former address, suggesting that 400 have no home to go to after leaving hospital. The readmission-rate is high, like everywhere else (e.g., for schizophrenic men and depressed widows it is over 60%). It seems highly significant, however, that this rate is mainly made up of a relatively small group of 150 patients who require repeated admission as a result of social failure. In addition a vigorous programme at Long Grove Hospital aims at the rehabilitation and resettlement of the chronic long-stay patients. This adds to the burden of after care, with the emphasis on prevention of relapse; and it is, of course, distinct from any preventive mental-health programme, although it represents an inevitable first step.

The Association's method is group-work designed to bring the patients out of their isolation. Group-work has conclusively shown that patients can be taught and will learn useful and socially acceptable norms of reasoning and behaviour. During this process, the patient passes from selfabsorbed preoccupation through identification with other members of the group to readjustment to his family and community. A similar educative process is undertaken with the families, who from the outset are under great stress and anxiety. They had to bear the brunt of the patient's disturbed behaviour, of family disruption, and of economic distress. Most of them still believe that mental illness is incurable, and doubts arise about the future place of the patient in his family and home. Group-work with the families allows these anxieties to be aired and allayed, and with the aid of recovered patients a climate of informed opinion arises ready to receive and care for the discharged patients.

Medical, social, and nursing staff help to run groups at ward level, while on the hospital level the patients organise their own meetings and publish a magazine. Subjects and problems of general interest only are discussed and graphically portrayed through socio-drama. There patients and staff enact situations which will face the patient on discharge from hospital and which constitute a frequent source of anxiety and failure. Films, lectures, and brains trusts add to the activities. Contact with the community is maintained by taking groups of patients to meetings in East London by coach.

The Association is based on two centres—at Woodberry

3. Pollak, V. E., Lawrence, J. R., Kark, R. M. To be published.
4. Brunjes, S., Zeke, K., Julian, R. *Amer. J. Med.* 1961, **30**, 529.
5. Watson, H., Emslie-Smith, D., Herring, J., Hill, I. G. W. *Lancet*, 1960, ii, 523.

Down Health Centre and at University House, Bethnal Green. Groups with similar objects are run weekly, consisting of ex-patients, family members, friends, a sociologist and his staff, representatives from the hospital, and other interested agencies —and not least sociology students. Before and after the meeting, informal interviews with patients and their families are possible which are superior to anything that can be achieved in an outpatient clinic. A daily advice bureau is maintained at Woodberry Down, and close contact is kept with the Ministry of Labour and National Insurance and the National Assistance Board.

To help the homeless patients, a lodging list is prepared and an effort made to house groups of 2 or 3 ex-patients together if one of them has surplus accommodation. A letter is sent to every patient leaving hospital telling him about existing services, inviting him to the Association, and asking him for information about his welfare. 20% of letters return "unknown", 30% do not reply, a small number of letters reveal great emotional distress or severe mental disturbance, and the remainder gratefully acknowledge the help they received. Among the 30% who do not reply are those who have been disillusioned with psychiatric treatment and who expect to be readmitted to hospital. This group's greatest need is the care of a social worker. An experiment to select a number of ex-patients to visit other patients has proved very successful and has saved many hours of social-worker time.

Time has been too short to assess results statistically, but the number of beds occupied at Long Grove Hospital continues to decrease and the admission-rate has passed its peak. The work has shown the magnitude of the problem of aftercare and the absolute need for close cooperation between hospital and local authority, while the Association places the emphasis on self-help by patients in the community.

Long Grove Hospital, Epsom. JOHN DENHAM.

FROM WORDS TO WARDS

SIR,—Dr. Fairley (Nov. 18) hits one nail right on the head. He adds to the plea that a body of men and women should be given resources to initiate inquiry and field studies into hospital planning and building, a further plea that such folk should "be men and women in touch with the realities of birth, life, and death in the machinery of a hospital".

However we may try, the hospital certainly seems to be regarded as a machine whose fuel consumption and output is watched by a battery of statisticians and accountants. Unfortunately there is no certainty that the conclusions and advice of such a body would be accepted. The profession itself is very conservative. Planners at all levels, confused by figures and bed occupancy, bedevilled by penury, and yet excited by these very realities of hospital service, now find their good intentions befogged by a General Nursing Council whose primary policy seems to be to redistribute hospital beds for the convenience of a nurse-training programme rather than for the needs of the community and for smooth working of the "machine". What encouragement is there to planners when the inadequacy of Whitleyism leaves hospitals short of plumbers, electricians, and telephone operators? No amount of planning will eliminate maintenance, and "bleeps" for the staff, like symptoms, only *call* the doctor. Our sympathies must be with the senior administrative medical officers at this time, for never has such stupendous planning been undertaken in such an atmosphere of uncertainty.

Dulwich, S.E.19. D. F. ELLISON NASH.

SIR,—In your leader of Oct. 26 you put forward strong arguments for informed collaboration between doctors and architects in the programme of new hospital construction. May I suggest that informed public opinion is also important?

In this city there is some discussion as to the site of the proposed new hospital, and there has been considerable correspondence in the local paper, including an excellent letter from the consultants concerned. But a reasoned request for the grounds for turning down other possible sites was answered by the secretary of the management committee with the flat statement that "a modern hospital requires a minimum of 20 acres". To the layman this appears an a-priori assertion. Would your contributors endorse it without qualification?

V. M. S. HEIGHAM.

SIR,—Mr. Leslie's essay (Nov. 11) was informative, timely, and made interesting reading; but his summary of the functions of the teaching hospital cannot, surely, go unchallenged. However necessary and laudable are its teaching and research roles, the primary function of any hospital, be it teaching or non-teaching, it is to treat patients—this is not just a means to an end.

Lambeth Group Hospital Management Committee, London, S.E.11. A. J. BRAND.

CONTAMINATION OF MILK BY RADIO-IODINE

SIR,—The uptake of strontium by vegetation can be limited by scattering calcium on the soil it grows on; and the distribution of potash on the land similarly prevents cæsium being taken up by plants and then being concentrated in the muscles of the animals that eat them. The distribution of natural iodine on pastures might prevent the uptake by grass of radioactive iodine in the soil. Of course, much of the fallout content of vegetation is that deposited directly on the leaf from the atmosphere, but the radio-iodine that comes from the soil via plant roots might be reduced in this way.

Seaweed compost mixed with chalk as a spreading agent supplies calcium to combat strontium, potash to combat cæsium, and natural iodine to combat radio-iodine. Used as a top dressing before the spring each year, this material might increase the fertility of cattle and improve pasture sufficiently to offset the extra cost to the farmer of producing dairy produce, such as milk, with a lower radioactive content.

Bexhill on Sea. MICHAEL ASH.

RESPIRATORY OBSTRUCTION DUE TO FAULTY CARLENS ENDOTRACHEAL TUBE

SIR,—The Carlens double-lumen intratracheal catheter is now widely used in thoracic anæsthesia and in bronchospirometry. The proximal (tracheal) cuff of the catheter normally lies some 3·0 cm. above the carina, and its inflation seals off the airway of the right main bronchus (or the left main bronchus in the case of the newer endobronchial type of catheter). The larger sizes 41 and 39 of the Carlens tube have a structural defect which may lead to obstruction of the airway of one bronchus. This defect consists of a deficiency in the wall of the catheter which may readily be felt on palpation through the proximal cuff. With the catheter in position even quite moderate distension of the proximal cuff (7–10 c.cm. of

air) can produce collapse of the tube wall on one side, and result in obstruction, partial or complete, of the airway on the affected side.

Partial obstruction may produce signs of apparent spasm of the affected bronchus; but a more common feature is arrest of a suction catheter at the site of the obstruction. Inability to pass a polyethylene sucker may often be thought to be due to distortion of the airway by the Carlens tube—but release of the cuff pressure will usually allow its passage. When left-lung anæsthesia is being maintained it may become impossible to completely deflate the right lung.

In complete obstruction, all these signs are present; if right-lung anæsthesia is being maintained, only removal of the Carlens tube or deflation of the proximal cuff will prevent disaster.

I have not found reference to this cause of obstruction in standard textbooks or in the literature, and I should like to draw the attention of anyone using the Carlens catheter to a possible hazard.

Department of Thoracic Surgery,
Victoria Hospital,
Blackpool.

B. HAYES.

LUMPERS, SPLITTERS, AND CONNECTIVE-TISSUE DISEASES

SIR,—According to J. N. P. Davies,[1] a self-confessed splitter, the medical community can be conveniently divided into lumpers and splitters. The lumpers, usually in the majority, are always searching for similarities and common causation in diseases. The splitters, on the other hand, delight in subdividing and collecting syndromes. They welcome multiple causation. Cycles in medical thinking can often be directly traced to variations in the number of adherents as well as the persuasive abilities of members of the two opposing camps. The connective-tissue disorders afford an example of this.

Before the time of Osler, medical writing on the connective-tissue diseases was for the most part descriptive, with emphasis on the individual differences among the various conditions. In a series of articles on the erythema group, Osler lumped together a diverse collection of clinical conditions that included lupus erythematosus, Henoch-Schönlein purpura, chronic nephritis, and others. Although he succeeded in calling attention to this group of diseases, he was chided for failing to differentiate the various entities from each other. He justified his position in 1904 [2] when he stated, "A criticism has been made on my previous papers that I had jumbled together a motley group of cases, some of purpura, some of angioneurotic œdema, others of peliosis rheumatica; others, again, of exudative erythema. I did so on purpose, for I was seeking similarities, not diversities . . ." He then apparently did a turnabout and placed himself firmly in the camp of the splitters by stating ". . . the members of the erythema group have not all the same etiology, and, indeed, as is well known, the individual members have a very diverse etiology." For the next four decades there was a great accumulation of knowledge about the characteristics of each of the various disorders. Details became clear; outlines distinct. It was an era of syndromes that saw the birth or elaboration of eponymic entities including Sjögren's, Felty's, Marie-Strumpell's, Reiter's, Libman-Sacks', Still's, Moschcowitz's, and others. Lines were finely drawn. It was truly a splitter's paradise.

The concept of " the collagen diseases " put a temporary end to this. Once again every unusual condition was cast in the same waste basket. Klemperer, who had fathered this concept, was appalled at the overenthusiasm of the lumpers. He expressed the views of many when he stated[3]: " By suggesting the term ' diffuse collagen diseases ' we unwittingly became responsible for a deplorable usage of this term as a collective diagnosis for those puzzling maladies which we had tried to differentiate by rational pathogenetic investigation."

In the 50s again there was a change of direction. The collagen diseases were once more dissected with a fine scalpel. The term " collagen disease " itself was shunned because of its " lumpy " implication. Painstaking analyses resulted in a great degree of differentiation and understanding. Now this is ending. The lumpers have recently made more powerful inroads than ever before. " Collagen disease " is back in vogue. The " overlap syndrome " is all about us. But the most vexing aspect of the present attitude is the complete acceptance of the catchall term " autoimmune disease ". Each day someone discovers an antibody, and the list of " autoimmune diseases " grows longer. The only limiting factor may well be the number of items that can be conveniently placed on a lantern slide. Occasionally one finds an urgent plea that some sort of adequate criteria be met before autoimmunity is assumed for a particular disease.[4] For the most part this conservatism goes unheeded. It certainly has not halted the proliferation of articles in which a whole group of diseases is lumped together and a unitary ætiology is accepted for all. The lumpers are running the show.

However, reflecting over the great swings in thinking about the connective-tissue diseases over the past half century, it is evident that medical history has a way of disappointing the majority—especially when everything seems certain. Splitters need not despair.

Permante Medical Group,
Kaiser Foundation Hospital,
Oakland. California.

MARTIN A. SHEARN
Director of Medical Education.

CHRISTMAS GIFTS FUND APPEAL

SIR,—I should like to remind your readers who have not yet responded to the President's appeal that it is our custom to distribute the gifts some days before Christmas. I hope all who can will send their contributions marked " Christmas Gifts " to the Royal Medical Benevolent Fund, 37, St. George's Road, Wimbledon, London, S.W.19, as soon as possible.

GEOFFREY H. BATEMAN
Honorary Treasurer,
Royal Medical Benevolent Fund.

Appointments

BOGDAN, ANDREW, M.D. Lond., M.R.C.P., D.C.H.: consultant in pædiatrics, Scarborough area.
DARK, A. J., M.D. Wales, F.R.C.S.E., D.O.: consultant ophthalmologist, United Sheffield Hospitals and Sheffield Regional Hospital Board.
HALLIDAY, A. B. C., M.G. Glasg.: assistant M.O. and school M.O., Cumberland.
MCCARTHY, J. M., M.B. N.U.I.: school M.O., Manchester.
TURNBULL, N. S., M.B. Edin., D.T.M. & H., D.P.H.: deputy M.O.H., Nuneaton.

East Anglian Regional Hospital Board:

BELL, D. J., M.B., D.OBST.: registrar in psychiatry, Fulbourn and Addenbrooke's Hospitals.
BIRNIE, A. J. M., M.B. Aberd.: orthopædic registrar, Ipswich and East Suffolk Hospital.
MCDERMOTT, F. T., M.B. Melb., F.R.C.S.: surgical registrar, Ipswich and East Suffolk Hospital.

Sheffield Regional Hospital Board:

BARRETT, A. F., M.B. Lond., F.F.R., D.M.R.D.: consultant radiologist, Nottingham area.
FOWLER, B. J., M.B. Lond., F.R.C.S.: consultant general surgeon, Grantham area.
OWEN, GORONWY, M.B. Wales: consultant chemical pathologist, City General Hospital, Sheffield.

Colonial Appointments:

AVRILLON, J. R., M.B. N.U.I.: assistant surgeon, Mauritius.
DUNCAN, B. R., M.B. Lond.: M.O., South Pacific Health Service, Fiji.
FLETCHER, G. H., M.B. Lpool, T.D.D.: deputy director, pneumoconiosis medical and research bureau, Northern Rhodesia.
GRASSO, PAUL, M.D. Malta, D.T.M. & H., D.C.P.: specialist (pathologist), Nigeria.
GRAY, A., M.B. Durh.: director, pneumoconiosis medical and research bureau, Northern Rhodesia.
IMRAY, H. A., M.B. Aberd.: M.O., South Pacific Health Service, Fiji.
STEVENS, H. E., M.B. Sydney, M.R.C.P., D.P.H.: M.O., pneumoconiosis medical and research bureau, Northern Rhodesia.
TURNER, P. P., M.D. Lond., M.R.C.P., D.P.H., D.I.H.: specialist (physician), Uganda.
VELLIN, L. A., M.D. Marseilles: medical superintendent, Brown Sequard Hospital, Mauritius.

1. Davies, J. N. P. *Amer. Heart J.* 1960, **59**, 600.
2. Osler, W. *Amer. J. med. Sci.* 1904, **127**, 1.
3. Klemperer, P. *in* Progress in Fundamental Medicine. Philadelphia, 1952.
4. Osgood, E. E. *Arch. intern. Med.* 1961, **107**, 313.

Parliament

Commonwealth Immigrants Bill

THE main object of this Bill is to control immigration into the United Kingdom of citizens from other parts of the Commonwealth. People who already have jobs or who have qualifications likely to be useful in this country will be granted entry, as will people who can prove that they can support themselves and their dependants without working. Another group will be granted entry by the immigration officers under "administrative arrangements", and Mr. R. A. BUTLER, the Home Secretary, who moved the second reading of the Bill in the House of Commons on Nov. 16, said that this would include students from overseas. Other would-be immigrants would have to rely on a quota of vouchers which would be issued on a first-come first-served basis.

Under the Bill entry could be refused on grounds of health. An immigrant could be excluded "if it appears to the immigration officer, or to a medical inspector, that he is a person suffering from mental disorder, or that it is otherwise undesirable for medical reasons that he should be admitted". The medical inspectors would be appointed by the Health Ministers and would act in accordance with instructions given by them.

As it stands at present, the Bill does not apply to citizens of Eire, but the Government is reconsidering this. It has been arranged to take the committee stage on the floor of the House, so that its provisions may be fully discussed by all members. The Bill has aroused great controversy, outside as well as inside the House.

QUESTION TIME

Lloyd Roberts Lecture

Mr. L. A. PAVITT asked the Prime Minister whether the Lloyd Roberts lecture given by the Minister of Health to the Royal Society of Medicine on the subject of expenditure on the National Health Service represented the policy of Her Majesty's Government.—Mr. HAROLD MACMILLAN replied: The Minister of Health made no pronouncements of policy in this lecture.

Mr. PAVITT: Is the Prime Minister aware that the impression has been given by this speech that it has been announced that Government policy will be to restrict the increase of expenditure on the National Health Service to a rate of $2^1/_2\%$ for the next four years? Is he further aware that that has had wide publication in medical journals and that the health service will be given the impression that it is Government policy so to restrict? Is he further aware that if the Government were to decide to restrict to this rate of $2^1/_2\%$, in terms of real money that would mean an actual decrease and the health service would have to be cut?—Mr. MACMILLAN: That raises much wider questions. As I understand it, the Minister delivered a carefully thought-out lecture, with many interesting philosophic observations, advancing the thesis that there were no objective criteria by reference to which the right level of total health service expenditure could be determined. It was intended to be, not a declaration of policy, but a lecture on a very interesting and serious subject.

Mr. KENNETH ROBINSON asked the Minister whether it remained his policy to limit the annual increase of expenditure on the National Health Service to $2^1/_2\%$ for the next four years.—Mr. POWELL replied: The Government's intentions regarding increases in health service expenditure remain as announced by the Chancellor of the Exchequer on July 26.

Mr. ROBINSON: Did not the Minister, in the course of his Lloyd Roberts lecture, state that the increase in the expenditure on the service should be limited to $2^1/_2\%$ for the next three or four years? Does not this mean that had this limit been imposed in recent years there would in fact have been a progressive annual cut in the service? Is it his intention that the service shall be cut during the next four years?—Mr. POWELL: No, Sir. The statement that I made was a repetition of the statement of the Chancellor of the Exchequer. The increase in real expenditure on the service in recent years has been broadly of this amount, but the real increase in the effectiveness of the service is by no means to be measured by the total sum spent on it year by year.

Mr. PAVITT: If the Minister is to adhere to this ceiling of $2^1/_2\%$, will it be in terms of real money, and will he make some adjustment for it, or will it be a straight $2^1/_2\%$?—Mr. POWELL: It is at current wages and salaries. Mr. ROBINSON: Will the Minister make clear whether the $2^1/_2\%$ includes any increases there may be in wages and salaries? He talked in one breath about the real increase and in another breath about the overall increase. Which is it to be?—Mr. POWELL: The words used in the passage which I quoted, are "in real terms".

Night-call Services

Mr. PAVITT asked the Minister how many emergency night-call services for general practitioners were now operating.—MR. POWELL replied: I know of 4. MR. PAVITT: Is it not time that the Ministry had a policy with regard to emergency night services for general practitioners? If these are good things, ought not the Minister to sponsor them through local executive councils so that they can be organised by the medical profession? If they are bad, should not the Ministry make a statement to that effect?—MR. POWELL: I agree that some form of control is necessary, and I am considering with the profession what form it could best take.

Psychiatric Treatment of Prisoners

Mr. ROBINSON asked the Home Secretary in which prisons psychiatric treatment was available on a continuing basis; how many qualified psychiatrists, in wholetime equivalents, were employed in the prison service; and how many prisoners were receiving regular psychiatric treatment.—Mr. R. A. BUTLER replied: At present nine visiting psychiatrists are treating 171 inmates at twenty-three sessions in each week at Wormwood Scrubs, Wakefield, Holloway and Pentonville prisons and at Feltham borstal. In addition, psychiatric treatment is provided by prison medical officers, many of whom hold psychiatric qualifications. The whole-time equivalent is not ascertainable.

Mr. ROBINSON asked the Minister when he expected Grendon Underwood psychiatric prison to be completed; how many prisoners it would accommodate; what was the proposed establishment of psychiatric and medical ancillary staff; and what staff had been appointed to date.—Mr. BUTLER replied: The establishment is expected to receive its first inmates early in June, 1962. The numbers will be built up gradually to a maximum of 300 men and 25 women. The head of the establishment, who will be a principal medical officer of the prison medical service, has been selected and will take up his appointment shortly before the establishment opens. The complement of other medical and ancillary staff has not yet been settled.

A Death in Prison

Mr. ROBINSON asked the Home Secretary what psychiatric treatment had been given to Thomas Nelson, a Dartmoor prisoner who recently died in a strait jacket, since his imprisonment; and why he was not transferred to a mental hospital under the provisions of section 72 of the Mental Health Act 1959.—Mr. R. A. BUTLER replied: This prisoner was not suitable for psychiatric treatment or transfer to a mental hospital.

Mr. ROBINSON asked the Minister if he would arrange for an independent inquiry into the circumstances in which this prisoner came to be wearing a strait jacket and occupying a padded cell at the time of his death.—Mr. BUTLER replied: The prisoner was placed in a loose canvas restraint jacket and located in a padded room because he had become violent and was injuring himself. A postmortem examination by an outside pathologist showed death to be due to myocardial ischæmia. At the inquest a verdict of death from natural causes was returned.

Obituary

WILLIAM FLETCHER SHAW

Kt., M.D. Manc., LL.D., F.R.C.P., F.R.C.O.G., Hon. F.A.C.S., Hon. M.M.S.A.

Sir William Fletcher Shaw, emeritus professor of obstetrics and gynæcology in the University of Manchester and a founder and past president of the college of his specialty, died on Nov. 14 at the age of 83.

Stoneman

Born at Clayton Bridge, then a small village four or five miles from Manchester, he was educated at Manchester Grammar School and at Owens College. Having qualified in medicine in 1903—the year in which Owens College became the Victoria University of Manchester—he was appointed house-surgeon at the Manchester Royal Infirmary. On leaving the infirmary, he went to St. Mary's Hospital, Quay Street, first as a house-surgeon and later as resident surgical officer, an appointment he held for many years. There he worked under some of the early obstetricians and gynæcologists—among them David Lloyd Roberts, Sir Japp Sinclair, Walls, and Donald—and he became in turn assistant to the outpatient department, pathologist (setting up the first pathological laboratory), and, in 1912, assistant surgeon. In the same year he was also elected gynæcologist to the Christie Hospital, and in 1919 he joined the staff of the Manchester Royal Infirmary. In 1920 he became professor of systematic obstetrics and gynæcology in the university, on the retirement of Prof. Archibald Donald. Five years later, on the death of William Edward Fothergill, he became professor of clinical obstetrics and gynæcology.

Fletcher Shaw was an enthusiastic and able teacher, and he will be remembered by younger colleagues in many countries. R. N., one of his former students, says:

"He taught us basic, important facts of our subject and did not overburden us with unessential details. We were grateful to him for his complete set of lectures, an accomplishment rare in my student days. He carried this love of teaching to the outpatients and to the theatre, where his house-surgeons recall with mild amusement how he would be so engrossed in teaching the students about the case on whom he was next to operate that he would often scrub up for half an hour or more.

"In the years that I was his operative assistant, the fact that stood out most was the large number of visitors from distant countries who came to see him. They came to see him perform the operation for prolapse, which had been conceived in Manchester by Donald and Fothergill and modified by each gynæcologist to suit his own taste. Sir William popularised this operation all over the world, and made it standard practice in most medical centres. He himself liked it to be called the Manchester operation; and this name is in fact used more perhaps than any other. Visitors also came to watch him perform vaginal hysterectomy, an operation which he kept alive in Manchester where it had fallen into disfavour. He would often explain how, many years before, his old chief Walls had performed this operation with a dexterity he had never seen equalled. But many visitors, especially in later years when colporrhaphy and vaginal hysterectomy had become fashionable operations, came because they liked Sir William.

"As a founder member of one of the oldest medical travelling clubs in Britain, the Gynæcological Visiting Society, he himself travelled to most of the medical centres in Europe. In his earlier years Vienna was one of his favourite hunting-grounds; and before the first world war he would return from that school of medicine, so rich in knowledge and culture, with new ideas of technique or some new elegant instrument. He visited, and knew personally, such men as Wertheim and Shauta, and, following Wertheim's methods closely and painstakingly, he performed his hysterectomy on a large series of cases of carcinoma of the cervix, which he recorded in *The Lancet* in 1927.

"When the National Health Service was started he watched its progress, and the emerging pattern, with concern and interest. After a few years he was convinced that, in so large a region as Manchester, there was need for the consultants to get together, and under his guidance and persuasion meetings were arranged twice each year, once in St. Mary's Hospitals and once at a regional centre. Much of the development in gynæcology, and many of the early staffing arrangements, were carried out under his supervision as adviser on that subject under the N.H.S. He was always willing to see any young gynæcologist, to advise or help in any way he could."

About the time of his appointment as a professor, Fletcher Shaw began to take a leading part, along with Blair Bell of Liverpool, in a movement to found a College of Obstetricians and Gynæcologists of the British Empire; and he in fact became its first secretary. R. W. J., who was his friend for over forty years, writes of these years:

"I cannot recall any time when his mind was not occupied in greater or less measure with the idea of a college of obstetricians and gynæcologists, with the primary object of its becoming ultimately the one portal through which, after training and examination, future consultants in these subjects would have to pass. I feel sure that this idea was quickened in his mind when in 1920 he was elected a member of the Gynæcological Visiting Society (founded by Blair Bell in 1911); for the whole atmosphere of that club was such as to foster high aims and standards for our conjoined specialties—and be it remembered that in those days obstetricians had vastly more serious and difficult practical difficulties to cope with than is the case nowadays. But my immediate point is that when Blair Bell learned of Shaw's idea of a college he took it up with the almost religious fervour that was characteristic of his eager mind and dæmonic spirit. The two men formed an ideally complemental partnership for the conversion of a concept into a practical project and of a project to a reality. In the G.V.S. they found a ready-to-hand council for consultation and encouragement, and it was, in effect, out of that body that the British College of Obstetricians and Gynæcologists was born.

"Seldom is it granted to a man in his own lifetime to see one of his early dreams become embodied in reality, activated into abundant fruition, and given a splendid local habitation and even a royal name. Such was the lot of William Fletcher Shaw, and it was a remarkable achievement."

In 1941 he became president of the college, and even in retirement—if it could be called retirement, for he never seemed to cease to work incessantly—he continued to take part in its counsels and to nurture its growth. In 1954 he published *Twenty-five Years History of the College 1929–54*.

The affairs of the college took him to most of the Dominions. He visited Canada, Australia, New Zealand, and South Africa. In 1936 the American College of Surgeons conferred on him their fellowship, and in 1941 the Royal College of Physicians of London did the same. He was knighted in 1942.

"He had (writes R. N.) a remarkable memory; and, by suitable questions, one could get him to talk of medicine in the early days before the advent of the telephone or the motor-car, when the surgeons of the Royal Infirmary, then in Piccadilly, were summoned by message of hand, usually brought by the surgeon's favourite cabby to the surgeon. If we could get him to talk about the characters of those days, Lloyd Roberts, Sir Japp Sinclair, and many another notable, we certainly enjoyed a feast of local medical history.

"He was, in fact, deeply interested in, and maybe very much in tune with, the way of life of earlier days. His close friends knew of his intimate knowledge of the Gothic architecture of France, of Eastern carpets, of English painters, of old English houses, old silver, and so on and so on. His interest was deeper than the material things he observed or collected; and was centred rather on the gracious way of living of bygone days.

"However, I think it is fair to say his whole life was, in the main, devoted to medicine. Wholeheartedly he strove to advance the cause of obstetrics and gynæcology; and to this end he used most ably every talent that he possessed."

Sir William is survived by two sons. A third son was killed on active service in 1945.

LESLIE ROOPE WOODHOUSE PRICE

M.A., M.D. Cantab.

Dr. L. R. Woodhouse Price, director of pathology at Queen Mary's Hospital for the East End and pathologist to the West End Hospital for Nervous Diseases, died in London on Nov. 14. He was 64 years of age.

The son of Dr. A. E. Price, he was educated at Harrow, Sidney Sussex College, Cambridge, and St. Bartholomew's Hospital. Soon after qualifying in 1923 he decided to specialise in pathology, and for some years he worked under Bernard Spilsbury. In 1929 Woodhouse Price went to Glasgow as director of pathology at the Royal Beatson Memorial Hospital. In 1942 he returned to London on his appointment as pathologist to the Royal Marsden Hospital, and in 1948 he joined the staff at Queen Mary's Hospital.

P. R. P., a Glasgow colleague writes:

"When he came here in 1929 Dr. Price introduced modern methods of filing and storing pathological specimens and sections, which are still in use today. His training with the late Sir Bernard Spilsbury had given him a taste for medico-legal work and he developed an ingenious portable laboratory outfit which he carried in his car ready for action at a moment's notice. He had a remarkable capacity for memorising data of all kinds and used to expound his method for mentally pigeon-holing information in a most entertaining way. While in Scotland he developed an enthusiasm for fishing; but he always longed to go back to London and he was glad of the opportunity to return in 1942. Those of us who remember him learnt with great sorrow of his passing."

M. S. R., who worked with him for the past fourteen years, sends the following personal tribute:

"A big man in physical and mental stature, W. P. was always impeccably attired in formal dress, usually with an exquisite rose of his own raising as a buttonhole. On first encounter the newcomer tended to be somewhat overawed in his presence, but further acquaintance revealed a lively humour beneath the rather overpowering surface which quickly made relations easy. His great interest was in pathological histology, especially the diagnostic biopsy, in which he was an acknowledged expert. In the field of rapid diagnosis at operation his services were much in demand and it was a pleasure to watch him at work in the theatre, a massive figure swathed in a green gown, smoothly and swiftly turning out his frozen section, scanning it, and strolling quietly into the operating-room to announce the result to the waiting surgeon. All the technical work of the frozen section he conducted personally, and, having his own mobile kit of microtome, gas cylinder, &c., he was able to operate in small hospitals and nursing-homes where such facilities were otherwise not available. Photography was also a subject at which he excelled. Much of the equipment in the laboratory dark room he had provided himself, and with this he would produce excellent photomicrographs and clinical photographs. Many of the staff of the hospitals which he visited will also remember with pleasure exhibitions of his personal collection of scenic colour transparencies. From time to time he would come in to the laboratory bearing a large brown paper parcel and ask us to examine 'this interesting specimen'. Further investigation would reveal the contents as a still-life or landscape in oils, probably on its way to or from an exhibition, for he was a painter of talent.

"W. P. was an enthusiast in all he did. After an operation in the summer he was back at work within two months reporting daily on all his sections, and he carried on with indomitable spirit until two days before his death. We shall miss the stimulus of his enthusiasm and his kindly presence."

Dr. Woodhouse Price leaves a widow, a son, and a daughter.

ROBERT JAMES HAMER HODGES

L.M.S.S.A., F.F.A. R.C.S., D.A.

Dr. Hamer Hodges, consultant anæsthetist to the Portsmouth group of hospitals and the Southampton thoracic unit, died on Nov. 10 a few hours after he had given an address to the South Western Obstetrical and Gynæcological Society autumn meeting.

After qualifying from St. Mary's Hospital in 1944, he held resident appointments in London at the Royal Marsden Hospital and the Miller General Hospital, and in Portsmouth at St. Mary's Hospital and the Queen Alexandra Hospital. He decided to specialise in anæsthetics and in 1952 he took the D.A. He spent six months as assistant professor of anæsthetics at the Western Reserve University at Cleveland. In 1954 he was elected F.F.A. R.C.S.

After he took up his appointment at Portsmouth he quickly won recognition both as a teacher and as an anæsthetist. His many publications show how wide his interests were. He formulated the working hypothesis that the prolonged administration of depolarising drugs makes the end-plate more resistant to depolarisation, and turned this clinical concept to practical use. He reported on his studies on muscle relaxants at international congresses. The induction of anæsthesia in young children was another of his subjects and a recent paper in our columns (*Lancet*,1960, i, 62) showed his sympathetic concern for his young patients. He also had done much work on obstetric anæsthesia, especially on the effects of anæsthesia on the fœtus, which was based on results collected by means of a record card which he had devised.

As a chief he won the interest, affection, and respect of his residents. One of them, P.B. writes:

"I first met Jim Hodges some six years ago when I came to work in Portsmouth. Characteristically he welcomed me to his home soon after my arrival. The conversation quickly turned to anæsthesia and he captivated me at once by the clarity and reasoned scientific thinking of his mind. His grasp of the problems of neuromuscular block and his ability to discuss them simply and lucidly were a joy and a revelation to me. Equally characteristic were his immense drive and infectious enthusiasm for his work. He never spared himself, despite his exceedingly poor health in recent years. If there is any triumph in his passing, it is that he died within hours of the end of an immensely successful congress at which he had given one of his superb addresses. As I said goodbye to him as I left the meeting, I congratulated him again on his address which I told him deserved to echo around the world—I hope it does. Jim's work, let alone his sacrifices, deserve immortality."

Another of his registrars, M. E. T. pays tribute to his integrity:

"Dr. Hamer Hodges had a clear logical reason for everything he said or did. He strove for perfection and expected it of others. As a teacher he was second to none and his ideas are indelibly printed in the minds of many who worked under him. He was known to successive resident anæsthetists as Uncle Jim and we always found him approachable in time of trouble or jubilation. His loyal support, wisdom, and systema-

tic approach to any problem were of inestimable help to us. His fairness was beyond reproach. The prodigous efforts of the last few months required for his various projects undoubtedly helped to shorten the borrowed time on which he was living. It is sad that he will no longer be able to take the brief rest he had promised himself when they were completed. His message is delivered, and his name will be immortalised in this country on the day when his obstetric anæsthetic service becomes the recognised right of every mother and her baby."

ADRIAN NICHOLAS GRIFFITH

M.B. Cantab., F.R.C.S., D.L.O.

Mr. Adrian Griffith, a former registrar in the aural and throat department at St. Bartholomew's Hospital and a senior lecturer in surgery at the hospital, died in London on Oct. 29 at the age of 33.

Born into a family in which the medical tradition went back five generations, he was educated at Stowe School, Christ's College, Cambridge, and St. Bartholomew's Hospital, London. Soon after qualification in 1952 he was attracted to otorhinolaryngology, and after his earliest house-appointments he decided to gain a wider experience in allied fields, and he served as a resident in plastic surgery, children's diseases, and neurosurgery. In 1959 with a Wernher research fellowship he spent some months in the University of Chicago, but ill health forced him to return to this country. Until earlier this year he continued his work at Barts.

T. E. C. writes:

"Adrian Griffith had already published several papers, and there was no doubt that a brilliant future lay ahead of him. His interest and enthusiasm in his work was extended over a wide variety of interests outside. In sport he preferred the individual pursuits, being a keen fisherman, skier, sailer, and photographer, and he had done some mountaineering and exploring in Newfoundland and Iceland. But he enjoyed the arts as well, and he was often to be seen at the opera, at concerts, and in picture galleries. His enthusiasm and love of life made him friends in many lands and in all walks of life, and he was always a leading spirit in whatever community he found himself. Such men are rare, and all who knew him will remember him with affection and will regret his early passing."

ALEXANDER CAMPBELL WHITE KNOX

C.B.E., M.C., M.B. Aberd.

Major A. C. White Knox, principal medical officer of the St. John Ambulance Association and until lately surgeon-in-chief of the St. John Ambulance Brigade, died in King's College Hospital, London, on Nov. 13 at the age of 72.

He was born at Auchnagatt, Aberdeenshire, and he was educated at Robert Gordon's College, Aberdeen, and Aberdeen University, where he graduated M.B. in 1913. After postgraduate study in Edinburgh, the United States, and Germany, he settled in practice in Denmark Hill. He worked for the first-aid movement for fifty years, and was responsible for the production of many first-aid books. He was appointed C.B.E. this year.

M. M. S. writes:

"As medical head of both the St. John Ambulance Association and Brigade, Sandy White Knox played a leading part in formulating teaching policy and technique, and his success was due largely to his realistic approach to this, especially his appreciation of the layman's point of view. Outwardly he was a jovial, solid, reliable chief, but inwardly he was a kindly and sensitive man. His interests were wide and diverse, and whatever he did was done superbly. He was approachable at all times, and was always ready to defend his views, or to modify them after discussion. His bearing and manner were dignified, without being aloof or unfriendly. He was physically and mentally a man of great stature. Above all, he was a man of great personal courage. The Military Cross that he won twice over in the Service was more than justified not only by the fortitude with which for several years past he endured the effects of a lesion which left him in continuous pain and with a marked limp, but above all by the heroic way in which he reacted to his long illness."

Major White Knox leaves a widow and a daughter.

Diary of the Week

NOV. 26 TO DEC. 2

Monday, 27th

POSTGRADUATE MEDICAL SCHOOL OF LONDON, Ducane Road, W.12
4 P.M. Prof. A. G. Macgregor: Endocrine Inter dependence.
ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1
5.30 P.M. *Odontology.* Prof. M. A. Rushton: Oral Effects of Injection of Strontium 90 (^{90}Sr) in Rabbits.
INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
4.30 P.M. Prof. F. Serri: Development and Structure of Fœtal Skin.
MANCHESTER MEDICAL SOCIETY
9 P.M. (Medical School, University of Manchester.) *General Practice.* Dr. G. E. Godber: Communication within the Profession.

Tuesday, 28th

ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East, S.W.1
5 P.M. Dr. J. A. Fraser Roberts: Genetic Prognosis. (Charles West lecture.)
BRITISH POSTGRADUATE MEDICAL FEDERATION
5.30 P.M. (London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.) Dr. E. G. Gray: Electron Microscopy of C.N.S.
ROYAL SOCIETY OF MEDICINE
8 P.M. *Medicine.* Dr. Michael Hamilton, Prof. Max Rosenheim, Dr. Richard Turner, Dr. Michael Harington: Drug Treatment of Hypertension.
INSTITUTE OF DERMATOLOGY
5.30 P.M. Dr. E. J. Moynahan: Biology of the Skin Surface.
ST. MARY'S HOSPITAL MEDICAL SCHOOL, W.2
5 P.M. Prof. Thomas McKeown: Human Prenatal Growth.
ROYAL ARMY MEDICAL COLLEGE, Millbank, S.W.1
5 P.M. Dr. Michael Kremer: Cerebral Ischæmia.
ROYAL STATISTICAL SOCIETY
5.15 P.M. (London School of Hygiene and Tropical Medicine.) *Medical Section.* Dr. Peter Froggatt: Accident-Proneness, or Variable Accident Tendency?
GENERAL INFIRMARY AT LEEDS
5.15 P.M. Dr. S. Doxiadis (Athens): Chronic Hepatic Amœbiasis.

Wednesday, 29th

POSTGRADUATE MEDICAL SCHOOL OF LONDON
2 P.M. Dr. K. Fotherby: Use of Steroid Hormone Investigations in the Diagnosis of Disease. (First of two lectures.)
INSTITUTE OF DERMATOLOGY
5.30 P.M. Prof. Aaron B. Lerner: Pigmentation. (Second of two lectures.)
INSTITUTE OF DISEASES OF THE CHEST, Brompton, S.W.3
5 P.M. Dr. J. C. W. MacFarlane: Laboratory Diagnosis and Chemotherapy of Lung Cancer.
ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, W.1
3.30 P.M. Dr. W. A. R. Thomson: Medicine and the Press.

Thursday, 30th

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.2
5.30 P.M. Prof. F. Bergel: Newer Developments in Carcino-chemotherapy.
UNIVERSITY COLLEGE LONDON, Gower Street, W.C.1
5 P.M. Dr. B. R. Rabin: Enzyme Catalysis. (Second of two lectures.)
BRITISH POSTGRADUATE MEDICAL FEDERATION
5.30 P.M. (London School of Hygiene and Tropical Medicine.) Dr. Imrich Friedmann: Electron Microscopy in Pathology of the Ear, Nose, and Throat—Experimental and Human.
WRIGHT-FLEMING INSTITUTE OF MICROBIOLOGY, St. Mary's Hospital Medical School, W.2
5 P.M. Prof. Ronald Hare: Sir Almroth Wright.
LIVERPOOL MEDICAL INSTITUTION, 114, Mount Pleasant, Liverpool, 3
8 P.M. Mr. Raphael Marcus: Diverticulitis of the Colon.
UNIVERSITY OF ST. ANDREWS
5 P.M. (Physiology Department, Queen's College, Dundee.) Prof. Ronald Woolmer: Medical Engineering.

Friday, 1st

UNIVERSITY OF LONDON
5.30 P.M. (London School of Hygiene and Tropical Medicine.) Prof. A. V. Neale: Child Health in its Medical, Educational, Cultural and Humanistic Aspects. (Last of five Heath Clark lectures.)
POSTGRADUATE MEDICAL SCHOOL OF LONDON
10 A.M. Mr. S. M. Cohen: Limb Gangrene.
4 P.M. Prof. R. M. Kark: Nephrosis and Glomerulo-nephritis.
KETTLE LECTURE
5 P.M. (Wolfson Institute, Postgraduate Medical School of London.) Prof. A. Policard: A Conflict of Living Matter with the Mineral World—the Pneumoconioses.
ROYAL SOCIETY OF MEDICINE
10.30 A.M. *Otology.* Mr. G. T. Hankey, Mr. F. C. W. Capps: Temporomandibular Joint Syndrome of Costen. Mr. A. S. Davidson: Endaural Meniscectomy.
2.30 P.M. *Laryngology.* Dr. Charles Edwards, Prof. E. P. Sharpey-Schafer, Sir Charles Symonds, Mr. P. H. Golding-Wood: The Laryngologist and Vertigo-cough Syncope.
6 P.M. *Anæsthetics.* Dr. B. A. Sellick, Dr. M. K. Sykes: The Anæsthetist's Role in Extracorporeal Circulation.

Saturday, 2nd

INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330, Gray's Inn Road, W.C.1
NOON. Dr. H. G. Pereira: Viruses of the Upper Respiratory Tract.

Notes and News

THE CHEMISTS AND THE N.H.S.

REPRESENTATIVES of the 137 pharmaceutical committees in England and Wales decided last week not to withdraw their services from the National Health Service, as it had been suggested they might.[1] Mr. George Graham, the chairman of the Central National Health Service (Chemist Contractors) Committee, explained that discussions between the committee and permanent officials of the Ministry of Health had seemed to be making no headway at all, but, as a result of a talk with Sir Bruce Fraser, permanent secretary to the Ministry, and a long discussion with the Minister, he believed that they had made a notable advance. The Minister had promised to consider very carefully the proposal of the committee that pharmacists should receive a professional fee for professional services; and the Ministry had admitted that pharmacists had had grounds for irritation in the statistical methods which had been used in the past, and had invited the committee to discuss with them quicker and less cumbersome methods of establishing pharmaceutical costs. The conference resolved: "That pharmacists should press for the full recognition of their professional status and that on this and other aspects of their work, just and fair arrangements should be made as a result of reasonable negotiations between the Ministry and the Central N.H.S. (Chemist Contractors) Committee; but that if progress has not been made towards these ends by the end of six months the conference will be convened again with a view to deciding on other methods of achieving our aim."

THE HORDER CENTRES FOR ARTHRITICS

SOME years ago, during a long stay in a hospital for rheumatic diseases, Miss Cecilia Bochenek conceived the idea of residential centres for severely disabled arthritics. In suitable surroundings, these patients would get medical treatment and would be helped to lead as full and active a life as their condition allows. When she put her plans to the late Lord Horder, he urged her to go ahead with them, and in 1954 he became president of the Horder Centre for Arthritics. "When you have built the first centre," he said, "there will be such a demand for admission that you will have to open centres up and down the country".

Fox Photos

Now, seven years later, the building of the first centre has begun at Crowborough in East Sussex. Already the waiting-list is long; for doctors and almoners are continually sending the names of potential residents. "Some of these patients are quite young arthritics lying in wards for the aged, growing stiffer and stiffer and nearer to despair each day. Others are living at home, frustrated by a life of irksome inactivity and firmly believing that they are 'finished'. Others, again, live in badly heated, sparsely furnished 'bed-sitters', dreading the day when the landlord will raise the rent or tell them to quit". Some will be admitted for a stay of three or four months, while others—those who cannot be cared for at home—will be accepted as permanent residents. Priority of admission will be given to those of working age.

The photograph is from a model of the completed centre. The patients will live in single ground-floor rooms built round a series of linked courtyards with sun lounges and sheltered terraces. The courtyards will be dominated by a centrally placed treatment block, with a communal dining-room above (reached by a lift). The centre is designed to provide the best possible environment, "with nothing institutional about it". All floors and external walls will contain efficient damp-proof membranes and special layers for thermal insulation.

When finished, the centre will take 120 patients and the necessary staff. It will, however, be built in stages, as funds come in; and a start has been made with the central block and only a single courtyard, to house 22 patients.

That this pilot scheme has reached this stage in only seven years is due to the faith and organising ability of Miss Bochenek, herself disabled by Still's disease since the age of 6 and housebound for the past 12 years. All who are associated with this charity are confident that the scheme will go on to completion. The initial stages are the most costly, both in building and maintenance, and the immediate need is money—donations, covenants, and legacies. But it is characteristic of the movement that, during the delay while funds are collected, it has already done something very useful for arthritics by arranging visits to those who are housebound and lonely. Last year, by means of its affiliated organisation, the Horder Centres Helpers, who now have 23 branches, more than 2000 arthritics were visited regularly, and this work is steadily extending. The visitors—some of whom are themselves arthritic—range in age from 12 to 75; and more are wanted.

The hon. medical adviser of the Horder Centres is Dr. Joyce Peake. Contributions and inquiries may be sent to her at the H.C.A. Office, 17, Rugby Mansions, Bishop Kings Road, London, W.14.

SHEFFIELD PUBLIC HEALTH LABORATORY

IN 1952 the Public Health Laboratory Service set up a regional laboratory in Sheffield under the directorship of Dr. E. H. Gillespie. Expansion has long been necessary; and the old laboratory has now been replaced by a new one, which was opened on Nov. 10 by Dr. G. E. Godber, chief medical officer of the Ministry of Health. The new laboratory is at City General Hospital, on a new floor above the group pathology laboratory and the former public-health laboratory.

A LUSTY TALE

Dr. George Goggins is the kind of medical biologist who emerges from a cultural tour of the châteaux of the Loire with the soi-disant wife of a Hungarian osteopath to the good, so to speak. This excursion is described in the first twenty pages of Dr. Alex Comfort's scientific fable,[1] and, if you can stand the pace, you can follow Dr. Goggins to Paris where, momentarily at a financial loss, he and his Dulcinea decide to run practical classes for married couples among the NATO expatriates. In this venture they have the support of an Indian psychiatrist and a French scientist who has isolated a new volatile di-acetyl derivative called 3-blindmycin with uninhibitory properties. For social reformers the group make unusually rapid progress, and by the end of the book Dr. and (now) Mrs. Goggins have won the recognition of State and Church and have received an honorary degree apiece, a life peerage, and a dameship.

Dr. Comfort is firm that the tale has no autobiographical foundation; but clearly he and Dr. Goggins share some, indeed quite a number of, prejudices. The funniest episodes are those based on acute clinical observation of political, social,

1. See *Lancet*, Oct. 21, 1961, p. 918; *ibid.* Oct. 28, 1961, p. 977.

1. Come Out to Play. By ALEX COMFORT. London: Eyre & Spottiswoode. 1961. Pp. 211. 16s.

and academic behaviour, and few of the principles, customs, or members of the Establishment escape Dr. Goggins' censure (or Dr. Comfort's satire). Even the editors of scientific journals will stir uneasily when they read how the *Quarterly Review of Chemical Communication Theory* returns an original article.

University of London

Dr. B. W. Lacey, reader in bacteriology at Westminster Medical School, has been appointed to the chair of bacteriology at the school.

Dr. Lacey graduated B.SC. Lond. in 1934 and two years later qualified from the Middlesex Hospital. After a house-appointment, he became assistant clinical pathologist at the Bland-Sutton Institute. In 1939 he joined the Royal Army Medical Corps. At first he served with the Army Blood Transfusion Service, but later he was pathologist to general hospitals in the Middle East. In 1945, with the rank of lieut.-colonel, he was appointed assistant director of pathology in Palestine. Afterwards he held the same appointment at G.H.Q., M.E.F., and was in command of the central pathological laboratory at Cairo. In 1946 he returned to the Bland-Sutton Institute, and in the following year he was appointed bacteriologist at the Westminster Hospital and Medical School. He became a reader in the university in 1952. He is meetings secretary of the Society for General Microbiology, and his published work includes papers on the mechanisms of chemotherapeutic synergy, on combined therapy, and on the influence of environment on the antigenic stucture of microorganisms.

Prof. J. T. Randall, Wheatstone professor of physics at King's College, has been appointed to the chair of biophysics at the college. He is honorary director of the Medical Research Council's biophysics research unit.

University of Bristol

The following appointments have been made:

Dr. D. B. Peacock, lecturer in bacteriology; Dr. B. L. Dowling, Dr. W. J. C. C. Rich, Dr. M. K. Tidman, Dr. A. M. Wilson, demonstrators in anatomy.

Royal College of Surgeons of England

Mr. William Gissane will give a Robert Jones lecture on Thursday, Dec. 14, at 5 P.M., at the college, Lincoln's Inn Fields, London, W.C.2. He will speak on the basic surgery of major injuries of the motorways.

Royal Faculty of Physicians and Surgeons of Glasgow

Prof. A. W. Kay will give a Blackham lecture on Monday, Dec. 4, at 5.15 P.M., at the Faculty, 242, St. Vincent Street, Glasgow. He will speak on the management of obscure alimentary bleeding.

British Association of Urological Surgeons

The annual meeting of this Association will be held from June 28 to 30 at the Middlesex Hospital Medical School, London, W.1. The programme will include a discussion on tumours of the testicle and its appendages when the speakers will be Dr. Roger Pugh, Mr. J. D. Fergusson, Prof. D. W. Smithers, Dr. E. C. Cotchin, and Dr. W. F. Whitmore. Further particulars may be had from the Association, 47, Lincoln's Inn Fields, London, W.C.2.

Staffing of Scottish Hospitals

The Secretary of State for Scotland, after consultation with representatives of hospital authorities and of the medical profession, has decided that in Scotland the review of hospital staffing proposed by the Platt Committee should be carried out by a central committee. He has appointed the following:

Dr. J. H. Wright, P.R.F.P.S. (chairman), Dr. F. D. Beddard, Dr. J. Bruce Dewar, Prof. D. M. Douglas, Mr. J. B. Hume, and Dr. A. K. M. Macrae. The secretary will be Mr. R. R. W. Stewart.

For their work in each region, the committee will be reinforced by three local representatives—one nominated by the regional hospital board and one by the regional consultants and specialists committee, and one representing general practitioners in the area.

Royal Society

One of the Royal medals of this society has been awarded this year to Sir Wilfrid Le Gros Clark for his contributions to neuroanatomy and primate morphology.

Quaker Medical Society

Sir Russell Brain will give a Lister lecture on Wednesday, Dec. 6, at 8 P.M., at Friends House, Euston Road, London, N.W.1. He will speak on medicine in the new renaissance.

Royal Photographic Society of Great Britain

Dr. R. G. W. Ollerenshaw will give a Renwick lecture on Tuesday, Dec. 5, at 7 P.M., at the society, 16, Princes Gate, London, S.W.7. His subject will be design for projection—a study of legibility.

Society of Chemical Industry

The second of a series of meetings on manufactured foods in the dietary control of disease, which are being held by the nutrition panel of this society, will be on Wednesday, Dec. 13, at 6.15 P.M., at 14, Belgrave Square, London, S.W.1, when the subject will be foods low in carbohydrate. The programme will include a paper by Prof. W. J. H. Butterfield on clinical aspects.

New Neonatal Research Unit

The Nuffield Foundation has made a grant of £55,000, over five years, to the Institute of Child Health to establish in the neonatal department of the Institute at the Hammersmith Hospital a research unit under the direction of Dr. J. P. M. Tizard, reader in child health. Dr. L. B. Strang has been appointed senior lecturer, Dr. L. Goldie part-time lecturer, and Dr. J. W. Scopes lecturer. The unit is to be named the Nuffield Neonatal Research Unit.

Modern Views on the Diagnosis and Management of "Stroke" Illnesses

The Chest and Heart Association are to hold a symposium on this subject on Tuesday, Jan. 23, at 3.30 P.M., at 1, Wimpole Street, London, W.1. The speakers will include Dr. J. P. Horder, Dr. John Marshall, Mr. Valentine Logue, Dr. A. T. Richardson, and Dr. Eliot Slater. The fee for the symposium will be two guineas, and further particulars may be had from the Association, Tavistock House North, Tavistock Square, W.C.1.

Mr. Enoch Powell, the Minister of Health, has appointed Mr. Martin Maddan, M.P., to be his parliamentary private secretary, in succession to Mr. Marcus Worsley, M.P.

The Royal Naval and Royal Marine Forces Volunteer Reserve Decoration has been awarded to Surgeon Commander R. D. G. Creery, Surgeon Commander G. De B. Hinde, and Surgeon Lieut.-Commander G. H. D. McNaught.

A meeting of the medical advisory panel of the London Amateur Boxing Association is to be held on Wednesday, Dec. 6, at 8 P.M., at the British Railways Film Unit, Savile Row, London, W.1, when Mr. W. E. Tucker will speak on athletic injuries.

At a meeting of the Christian Medical Fellowship on Wednesday, Dec. 6, at 6.30 P.M., at 26, Portland Place, London, W.1, Dr. S. G. Browne will speak on medical research—a challenge to Christian doctors.

Numbers 14 to 19 of the *Abstracts of Efficiency Studies in the Hospital Service* have been issued. They deal with the blood transfusion service (collection of blood—transport arrangements, no. 14); financial arrangements (analysis of expenditure—suppliers' invoices, no. 15, control of expenditure—engineering and building maintenance work, no. 16); outpatient arrangements (clinic accommodation, no. 17, planning data—movements between clinics and departments, no. 18); and portering services (disposal of ward refuse and soiled linen, no. 19). Copies of the leaflets may be had from H.M. Stationery Office. Numbers 15 and 17 cost 4*d*. each, 14, 16, and 18 8*d*., and 19 1*s*., or the whole set may be bought for 3*s*. 8*d*. (excluding postage).

CORRIGENDUM: *Fertility and Health in India*.—In Dr. Maung Sein's article on p. 1140 last week, the number of rural contraceptive clinics (line 6) appeared as 110. It should be 1100.